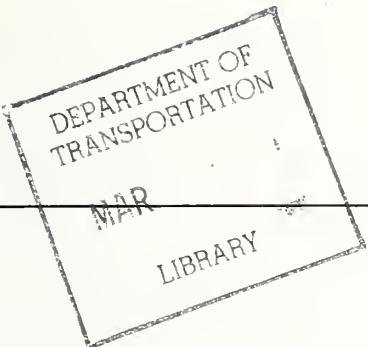




U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**



DOT HS 807 006

Test Report

December 1985

Side Impact Protection in Production Vehicles

**MDB-to-Car Side Impact Test of a
26° Crabbed Moving Deformable Barrier
to a 1985 Chevrolet Spectrum
at 33.6 mph**

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear only because they are considered essential to the object of this report.

242
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1985

Technical Report Documentation Page

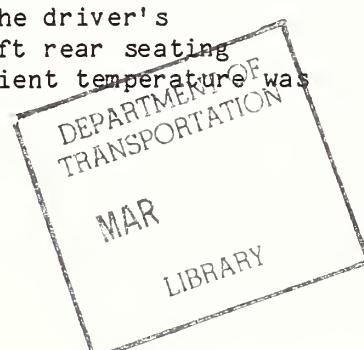
1. Report No. DOT-HS-807-006	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle SIDE IMPACT PROTECTION IN PRODUCTION VEHICLES MDB-To-Car Side Impact Test of A 26° Crabbed Moving Deformable Barrier To A 1985 Chevrolet Spectrum At 33.6 MPH		5. Report Date DECEMBER 1985	
7. Author(s) J.C. Stultz, Project Engineer, TRCO		6. Performing Organization Code 8. Performing Organization Report No. 851202	
9. Performing Organization Name and Address Vehicle Research and Test Center St. Rt. 33, Logan County East Liberty, Ohio 43319		10. Work Unit No. (TRAIS)	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration 400 Seventh Street, S.W. Washington, DC 20590		11. Contract or Grant No. DTNH22-82-A-08401	
		13. Type of Report and Period Covered TEST REPORT November-December 1985	
		14. Sponsoring Agency Code	
15. Supplementary Notes This test conducted as part of VRTC Project No. SRL 103 Side Impact Protection In Production Vehicles			
16. Abstract This test report documents one of a series of ten crash tests to evaluate side impact protection in various vehicle models. Testing was conducted on a 1985 Chevrolet Spectrum 3-door hatchback at the TRCO Crash Test Facility, East Liberty, Ohio. The test vehicle was impacted on the left side by a moving deformable barrier, crabbed to 26°, at 33.6 mph. The test was a simulation of a 90° intersection collision with the striking vehicle travelling at 30 mph and the struck vehicle travelling at 15 mph. Occupant responses of two side impact dummies were measured. One dummy was located in the driver's designated seating position and one was located in the left rear seating position. The test date was December 2, 1985 and the ambient temperature was 18°F.			
 17. Key Words Occupant Response Moving Barrier Crash Testing			
18. Distribution Statement Available from: National Technical Information Service Springfield, Virginia 22161			
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 162	22. Price

TABLE OF CONTENTS

	<u>Page</u>
1.0 PURPOSE AND INTRODUCTION	1-1
2.0 GENERAL TEST AND VEHICLE PARAMETER DATA	2-1
3.0 DATA REQUIRED BY R&D	3-1
APPENDIX A PHOTOGRAPHS	A-1
APPENDIX B DATA PLOT PRESENTATION	B-1
APPENDIX C DUMMY CERTIFICATION	C-1

LIST OF PHOTOGRAPHS

<u>Figure</u>	<u>Page</u>
A-1. PRE-TEST OVERALL - VIEW 1	A-2
A-2. PRE-TEST OVERALL - VIEW 2	A-2
A-3. PRE-TEST OVERALL - VIEW 3	A-3
A-4. PRE-TEST OVERALL - VIEW 4	A-3
A-5. PRE-TEST CLOSEUP - VIEW 1	A-4
A-6. PRE-TEST DRIVER DUMMY VIEW	A-4
A-7. PRE-TEST PASSENGER DUMMY - VIEW 1	A-5
A-8. PRE-TEST PASSENGER DUMMY - VIEW 2	A-5
A-9. POST-TEST OVERALL - VIEW 1	A-6
A-10. POST-TEST OVERALL - VIEW 2	A-6
A-11. POST-TEST OVERALL - VIEW 3	A-7
A-12. POST-TEST OVERALL - VIEW 4	A-7
A-13. POST-TEST DRIVER DUMMY VIEW	A-8
A-14. POST-TEST PASSENGER DUMMY VIEW	A-8
A-15. POST-TEST VEHICLE DAMAGE VIEW	A-9
A-16. POST-TEST OVERHEAD VIEW	A-9
A-17. PRE-TEST MDB FACE - VIEW 1	A-10
A-18. PRE-TEST MDB FACE - VIEW 2	A-10
A-19. POST-TEST MDB FACE - VIEW 1	A-11
A-20. POST-TEST MDB FACE - VIEW 2	A-11

SECTION 1.0
PURPOSE AND INTRODUCTION

PURPOSE

The main purpose of this test was to evaluate side impact protection in one of a fleet of 2-door and 4-door vehicles. The vehicle was tested using conditions not currently contained in a Federal Motor Vehicle Safety Standard.

INTRODUCTION

A stationary 1985 Chevrolet Spectrum 3-door hatchback was impacted on the left side by a Moving Deformable Barrier (MDB) on December 2, 1985. The test was to simulate an intersection collision with the striking vehicle travelling at 30 mph and the struck vehicle travelling at 15 mph. The orientation angle of the striking vehicle was 90° counterclockwise with respect to the longitudinal axis of the struck vehicle. The leading edge of contact was to be 37 inches forward of the vehicle center of gravity which is defined by accident investigation to be the midpoint of the wheelbase.

To simulate this collision, the MDB was to be towed into the stationary Chevrolet Spectrum at 33.5 mph with the MDB's wheels crabbed clockwise to 26°. The actual test speed was 33.6 mph and the actual leading edge of contact was 36.5 inches forward of the midpoint of the Honda Civic wheelbase.

The vehicle was a baseline model with no structural modification. The driver door and left rear door were unpadded.

Section 2 contains General Test and Vehicle Parameter Data. Section 3 contains data required by R & D. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains Data Plots. Appendix C contains Dummy Certification Data.

SECTION 2.0
GENERAL TEST AND VEHICLE PARAMETER DATA

The following data sheets describe the General Test and Vehicle Parameter Data.

TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: General Motors Corporation

MAKE/MODEL: Chevrolet Spectrum VIN: J81RF77KXF8423387

BODY STYLE: 3-Door Hatchback MODEL YEAR: 1985

NHTSA NO.: R & D COLOR: White

ENGINE DATA: TYPE: Transverse CYLINDERS: 4 DISPLACEMENT 90 CID

TRANSMISSION DATA: 5 Speed Manual

DATE VEHICLE RECEIVED: 11/22/85 ODOMETER READING: 1122

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	No	AUTOMATIC TRANSMISSION	No
POWER BRAKES	No	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TLTING STEERING WHEEL	No
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	No	AIR CONDITIONING	No
RADIO	Yes	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	No
OTHER			

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? Yes
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

DATA FROM CERTIFICATION LABEL ON LEFT DOOR FACE OR "B" POST:

VEHICLE MANUFACTURED BY: Isuzu Motors Ltd.

DATE OF MANUFACTURE: 1/85

GVWR: 2785 LBS.,

GAWR: FRONT 1520 LBS., REAR 1300 LBS.

VEHICLE TIRE DATA

RECOMMENDED COLD TIRE PRESSURE: FRONT 30 psi; REAR 30 psi

TIRES ON VEHICLE (MFGR. & LINE, SIZE): General GT P155-80R13

BIAS PLY, BELTED, OR RADIAL: Radial

PLY RATING: 3

IS SPARE TIRE "SPACE SAVER"? Yes

IS SPARE TIRE STANDARD EQUIPMENT? Yes

WEIGHT OF TEST VEHICLE AS RECEIVED FROM DEALER (WITH MAXIMUM FLUIDS):

RIGHT FRONT	572	LBS.	RIGHT REAR	344	LBS.
LEFT FRONT	592	LBS.	LEFT REAR	365	LBS.
TOTAL FRONT WEIGHT	1164	LBS.	(62.1 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	709	LBS.	(37.9 % OF TOTAL VEHICLE WEIGHT)		
TOTAL DELIVERED WEIGHT	1873	LBS.			

VEHICLE ATTITUDE (ALL DIMENSIONS IN INCHES):

DELIVERED ATTITUDE:	RF 26.0	;LF 25.4	;RR 26.1	;LR 25.6
PRE-TEST ATTITUDE:	RF 26.6	;LF 26.2	;RR 23.9	;LR 23.5
POST-TEST ATTITUDE:	RF 24.6	;LF 25.4	;RR 21.6	;LR 21.6

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 144 LBS. CARGO:

RIGHT FRONT	605	LBS.	RIGHT REAR	534	LBS.
LEFT FRONT	646	LBS.	LEFT REAR	580	LBS.
TOTAL FRONT WEIGHT	1251	LBS.	(52.9 % OF TOTAL VEHICLE WEIGHT)		
TOTAL REAR WEIGHT	1114	LBS.	(47.1 % OF TOTAL VEHICLE WEIGHT)		
TOTAL TEST WEIGHT	2365	LBS.			

WEIGHT OF BALLAST SECURED IN VEHICLE TRUNK AREA: 0 LBS.

TEST FLUID DATA

TEST FLUID TYPE: PURPLE STODDARD SOLVENT 2; SPEC. GRAVITY: 0.764

KINEMATIC VISCOSITY: 0.99 CENTISTOKES

"USEABLE" CAPACITY*: NA GALLONS ACTUAL

TEST VOLUME: 1.0 GALLONS

FUEL SYSTEM CAPACITY (DATA FROM OWNERS MANUAL): NA GALLONS

DETAILS OF FUEL SYSTEM: DNA

ELECTRIC FUEL PUMP: No FUEL INJECTION: No

DOES ELECTRIC FUEL PUMP OPERATE WITH IGNITION SWITCH "ON" AND THE ENGINE NOT OPERATING? DNA

DATA FROM "RECOMMENDED TIRE PRESSURE" LABEL ON DOOR, POST, GLOVEBOX, ETC.

VEHICLE LOAD (UP TO CAPACITY): FRONT 30 psi; REAR 30 psi

RECOMMENDED TIRE SIZE: P155 80R13 LOAD RANGE X B, C,

VEHICLE CAPACITY: TYPES OF SEATS: Front - Bucket
Rear - Bench

NUMBER OF OCCUPANTS (DESIGNATED SEATING CAPACITY): 2 FRONT

CARGO LOAD 125 LBS. 2 REAR

TOTAL 725 LBS. 4 TOTAL

*WITH ENTIRE FUEL SYSTEM FILLED WITH FUEL TANK THROUGH CARBURETOR BOWL.

TEST CONDITIONS

TEST NUMBER: 851202

DATE OF TEST: December 2, 1985

TIME OF TEST: 13:37

WIND VELOCITY: 15-20 mph 270°W

HUMIDITY: NA

AMBIENT TEMPERATURE AT IMPACT AREA: 18° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 70° F

SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
VEHICLE TEST WEIGHT (LBS.)	2365	2346
MDB TEST WEIGHT (LBS.)	3006	3000
MDB VELOCITY (MPH)*	33.6	33.5
IMPACT POINT (INCHES)**	36.5	37

DUMMIES

	<u>DRIVER</u>	<u>MIDDLE PASSENGER</u>	<u>RT. FRONT PASSENGER</u>	<u>LEFT REAR PASSENGER</u>	<u>RT. REAR PASSENGER</u>
TYPE:	SID			SID	
SERIAL NO.:	119			016	
INSTRUMENTATION:					
HEAD ACCEL.:	Yes			Yes	
CHEST ACCEL.:	Yes (Upper/Lower)			Yes (Upper/Lower)	
FEMUR L.C.'S:	No			No	
OTHER:	Pelvis/Ribs			Pelvis/Ribs	

RESTRAINT SYSTEM: Both dummies were unrestrained

* As measured over final one foot of travel.

** As measured forward of the midpoint of the test vehicle's wheelbase.

VISIBLE DUMMY CONTACT POINTS:

	<u>DRIVER 119</u> Top of barrier face, left side glass. Right side window sill, right head restraint.	<u>PASSENGER 016</u> <u>Left side roof header, side glass</u>
Head	<u>Right front side window sill</u>	<u>Right rear side wall</u>
Chest	<u>Driver's Door Panel</u>	<u>Left Rear Side Wall</u>
Abdomen	<u>Driver's Door Panel</u>	<u>Left Rear Side Wall</u>
Left Knee	<u>Driver's Door Panel</u>	<u>Left Rear Side Wall</u>
Right Knee	<u>Left Knee</u>	<u>Left Knee</u>

DOOR OPENING:

	<u>LEFT</u>	<u>RIGHT</u>
Front	<u>NA*</u>	<u>Easy</u>
Rear	<u>DNA</u>	<u>DNA</u>

SEAT MOVEMENT:

	<u>SEAT BACK FAILURE</u>	<u>SEAT SHIFT</u>
Front	<u>No</u>	<u>No</u>
Rear	<u>No</u>	<u>No</u>

GLAZING DAMAGE:

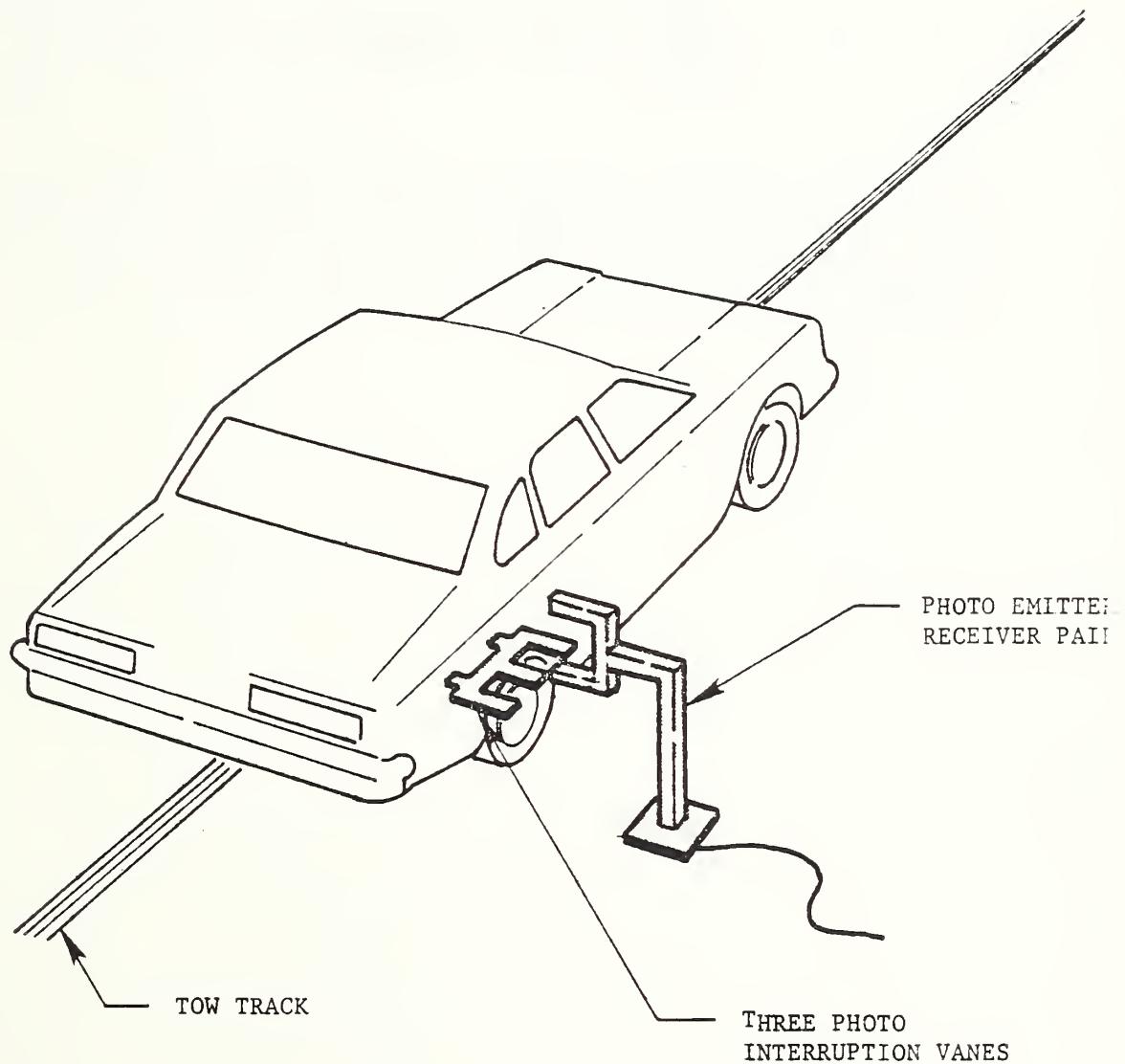
Left side of windshield cracked; all left side windows
shattered; no backlight damage.

OTHER NOTABLE IMPACT EFFECTS:

Driver's door remained hinged and latched.

* CTM to open left side doors at a later date.

IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane clears emitter/receiver two inches before impact.

The vanes have one foot spacing.

VEHICLE TEST WEIGHT CALCULATION

Test Weight = Unloaded Delivered Weight +
(Number of Dummies X 174 lbs.) +
Cargo Weight
= 1873 + (2 X 174) + 125 lbs.
= 2346 lbs.

To achieve test weight, the exhaust system, battery and alternator were removed and 1.0 gallon of Stoddard Solvent was added in the fuel tank. The weight of the test vehicle was measured by placing each wheel on a KJ Law Force Plate.

TEST ANOMALIES

Intermittent pin separation occurred in data channel T01XG1 - Driver Upper Spine Acceleration X axis at approximately 77 msec. Peak levels prior to pin separation are reported. This separation affects the resultants.

SECTION 3.0
DATA REQUIRED BY R&D

The following pages are included in this section:

1. Dummy temperature control and positioning data
2. Dummy kinematic summary
3. Vehicle crush data
4. Dummy and vehicle accelerometer location and data summary
5. High speed camera information
6. Transducer information

DUMMY TEMPERATURE CONTROL AND POSITIONING

The vehicle was kept inside the temperature controlled crash test building until approximately 2 hours prior to the test. Temperature inside the vehicle and ambient temperature at the crash area were recorded. Dummy temperature while outside the crash test building was maintained portably until approximately 1 minute prior to the test.

The following Side Impact Dummy Seating Procedure summarize the steps taken to position the instrumented, calibrated dummies in the test vehicle.

SIDE IMPACT DUMMY SEATING PROCEDURE

1. Seat Positioning

A. Place seat at the longitudinal midpoint of fore to aft adjustment (forward most locking position to rear most locking position). If no locking position is available at mid-travel, use the position immediately rearward of mid-travel.

B. If the seat back angle is adjustable, place it in the manufacturer's stated nominal design location. If not specified, set it at the first detent rearward of 25°.

C. Adjustable head restraints are set such that the top surface of the restraint is level with the cg of the dummy's head.

D. If the seat is equipped with adjustable side or lumbar supports, they are set in their "released" or full back positions.

E. All other seat adjustments are positioned to their mid-travel locations. If locking positions are not available at these mid-points, use the position immediately rearward, down, left or clockwise of mid-travel. Clockwise is defined looking rear to front or left to right relative to the vehicle. This also applies to adjustable steering columns.

2. H-point Determination

A. The SAE three-dimensional H-point machine (SAE J826 APR80 - 50th percentile male configuration) is used to locate the H-point for each surrogate.

B. The H-point machine is positioned on the seat as follows:

1. Bucket or Contoured Seats - The H-point machine is centered on the bucket or contour such that its midsagittal plane is vertical and longitudinal.

2. Bench Seats

a. driver position - The H-point machine is positioned such that its midsagittal plane is vertical, longitudinal, and contains the steering wheel center point.

b. outboard passenger positions - The H-point machine is positioned such that its midsagittal plane is vertical, longitudinal, and the same distance from the longitudinal vehicle centerline as that for the driver position.

c. Center passenger positions - The H-point machine is positioned such that its midsagittal plane is vertical and contains the longitudinal vehicle centerline.

C. Locate the H-point position using the steps outlined in sections 4 through 6 of SAE Standard J826 APR80, unless otherwise specified in section 1 or 2 of this document. Record the coordinates of this point, relative to the vehicle, for use in section 4 of this document.

3. Test Dummies

A. All NHTSA side impact crash tests use the NHTSA Side Impact Dummy (SID) as the surrogate(s), unless otherwise specified by the CTM.

B. All dummy joints are inspected for mobility prior to each test usage and reset to hold between 1 and 2 g's. This amount just barely restrains the weight of the individual limb when it is extended horizontally.

C. Each test dummy is clothed in form-fitting cotton stretch underwear with short sleeves and mid-calf length pants. Each foot of the dummy is equipped with a size 11EE shoe which meets the configuration, size, sole, and heel thickness specifications of MIL-S-13192 and weighs 1.25 ± 0.2 pounds. All the above items are supplied by the contractor.

4. Initial Dummy Placement

The SID dummy(s) is placed in the vehicle seat with its pelvis

positioned such that a lateral line passing through the dummy H-point is perpendicular to the longitudinal centerplane of the vehicle.

A. Bucket or Contoured Seats. The dummy is centered on the bucket or contoured seat such that its midsagittal plane is vertical and longitudinal. The legs are positioned as follows, keeping the femur and tibia centerlines in a plane that is as near to vertical as possible.

1. driver position placement - The right foot of the dummy is placed on the undepressed accelerator pedal, with the heel resting on the floorpan as far forward as possible. The left knee is positioned such that the distance from the outer surface of the knee pivot bolt to the dummy's midsagittal plane is 6 inches.

2. passenger position placement - The knees of the dummy are initially set 11 1/2" apart, measured between the outer surfaces of the knee pivot bolt heads. If a center tunnel prevents this, place the feet on either side of the tunnel.

B. Bench seats.

1. driver position placement - The dummy is placed in the seat as outlined in section 4.A.1 except that its midsagittal plane is vertical, longitudinal and contains the steering wheel center point.

2. outboard passenger positions - The dummy is placed in the seat as outlined in section 4.A.2 except that its midsagittal plane is vertical, longitudinal, and the same distance from the vehicle centerline as that for the driver position.

3. center passenger positions - The dummy is positioned in the seat as outlined in section 4.A.2 except that its midsagittal plane is vertical and contains the vehicle centerline.

5. Initial Dummy Positioning

A. H-Point Positioning

1. With the dummy laterally positioned as in section 4, insert the pelvis angle indicator bar in the hole provided above, and to the rear of the dummy H-point. Position the longitudinal pelvis angle between 23° and 25° to the horizontal. This may be accomplished by raising the legs or flexing the upper torso forward and allowing the

pelvis to rotate. The lateral pelvis angle is to be horizontal.

2. Apply sufficient force on the lower torso in a horizontal and vertical direction to place the dummy H-point at the coordinates obtained in section 2.

3. If the H-point cannot be placed at the desired coordinates, adjust the pelvis angle within the 2° band and reposition to the coordinates. After repositioning the H-point, any deviation from the desired coordinates is recorded and used to indicate actual H-point locations. This deviation is not to exceed 1/2".

B. Upper Torso Positioning. The dummy's upper torso should rest against the seat back. If not, adjust the upper torso, maintaining the H-point location and pelvis angle, so that the dummy's back rests against the seat back. If this cannot be done, modify the H-point location and/or pelvis angle within the allowable bands until the back rests against the seat.

6. Final Dummy Positioning

A. Driver Position. Without inducing pelvis or torso movement, the dummy's right foot is placed on the undepressed accelerator pedal with the heel resting as far forward as possible on the floorpan. The left foot is set perpendicular to the lower leg with the heel resting on the floorpan in the same lateral line as the right heel. If possible within these constraints, the dummy's thighs should be in contact with the seatpan.

B. Front Passenger Positions. Without inducing pelvis or torso movement, place the dummy's feet on the vehicle's toeboard with the heel resting on the floorpan as close as possible to the intersection of the toeboard and floorpan. If the feet cannot be placed on the toeboard, they are set perpendicular to the lower legs and placed as far forward as possible such that the heels rest on the floorpan.

C. Rear Passenger Positions. Without inducing pelvis or torso movement, the feet are placed flat on the floorpan and beneath the front

seat as far forward as possible without front seat interference. If necessary, change the distance between the knees as required to place the feet beneath the seat. Record the new distance.

D. Vehicles with wheelhouse projections in the passenger compartment. The foot (feet) in question is placed in the wheel of the floorpan/toeboard and not in the wheelhouse projection. This is done by twisting the foot at the ankle, maintaining the upper and lower leg positions outlined in section 4. If this does not resolve the situation, move the leg of the foot in question just enough to achieve the correct position, keeping the femur and tibia centerlines in a plane that is as near to vertical as possible. Record the new distance between the knees.

E. The knee positions are to be as outlined in section 4, unless modified as in section 6. The plane containing the femur and tibia centerlines for each leg is to be as near to vertical as possible without inducing pelvis or torso movement. Record the distance between the knees for each dummy.

F. Prior to conducting the test, the dummy position is visually checked. The dummy is to be properly positioned laterally with its midsagittal plane vertical and longitudinal, and the upper torso resting against the seat back. The H-point and pelvis angle are to be within the specified ranges and the foot, knee, and leg placements are to be as outlined. The CTM is to be satisfied with the final dummy position and any deviations from this procedure are to be approved by the CTM.

G. The final dummy position is recorded. These measurements are to include, but not be limited to, pelvis and head angles as well as actual H-point and head cg locations relative to the vehicle. The straight-line distance from the H-point to the center of the outer ankle bolt is also recorded for one of the legs (eg. left H-point to left ankle bolt).

DUMMY IN-VEHICLE POSITION RECORDING SHEET

VEHICLE NHTSA NO. R & D

MFR./MAKE/MODEL: Dhevrolet Spectrum

FRONT SEAT TYPE: BENCH
 BUCKET
SPLIT BENCH

ADJUSTER TYPE: X MANUAL
POWER

BUCKET SEAT BACK TYPE: FIXED
 ADJUSTABLE

TECHNICIANS:

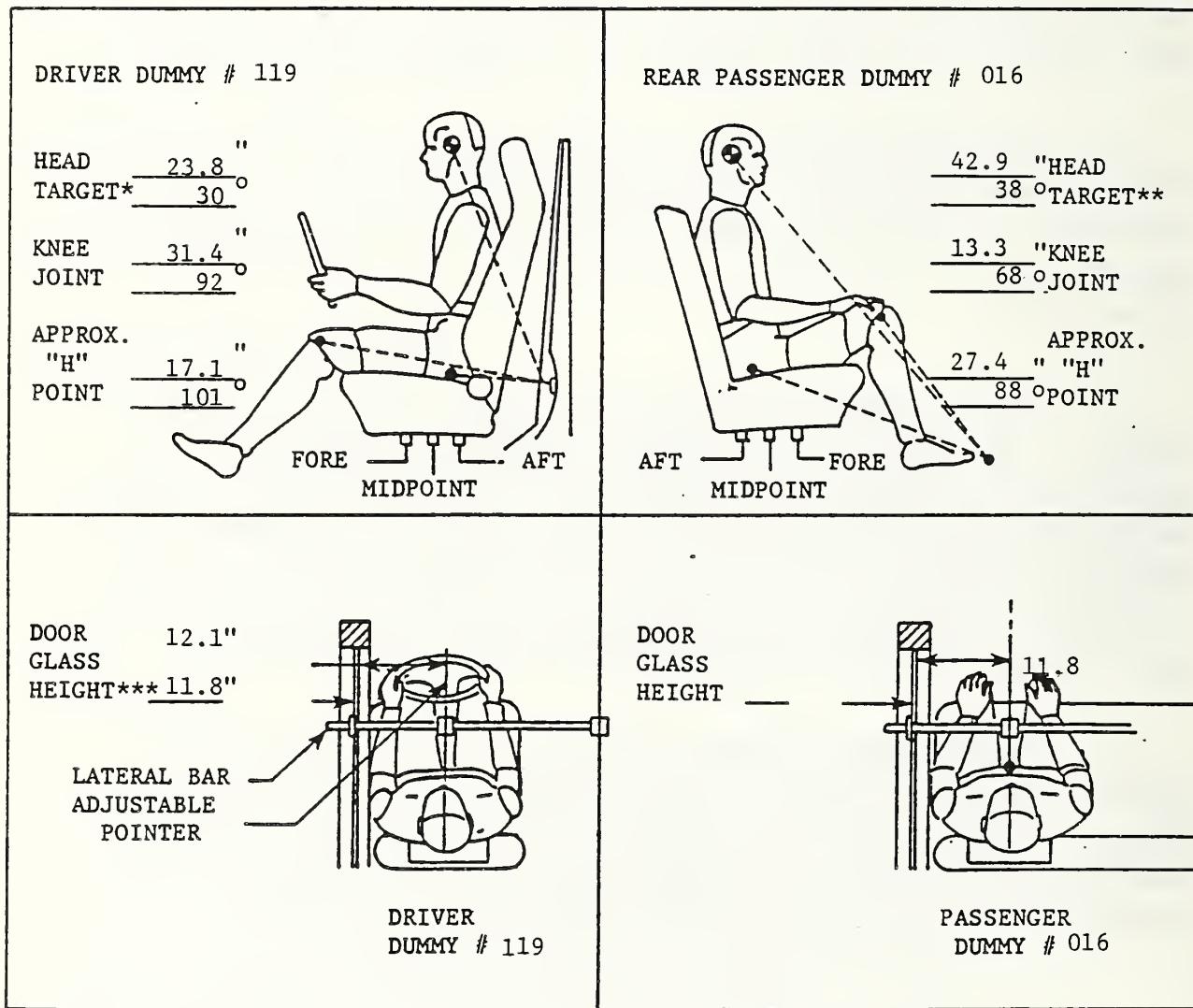
1. B. Miller

2. B. Fishbaugh

3. _____

POSITIONING DATE: December 2, 1985

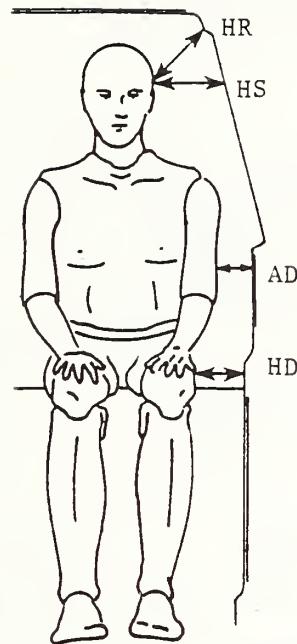
AMBIENT TEMP.: 68° F. TIME: 9:15



*All driver dummy dimensions referenced to top of striker bolt and all angles referenced to vertical.

**All passenger dummy dimensions referenced to front seat back latch bolt with front seat in mid-position and all angles referenced to vertical.

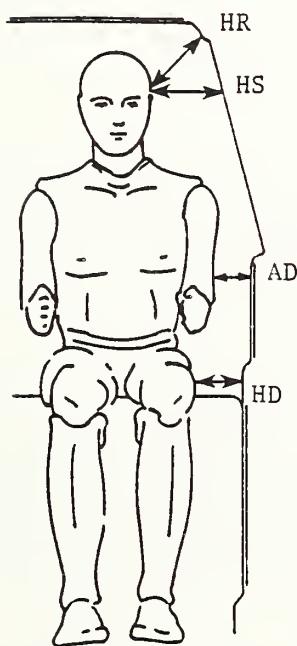
***Door glass height is equal on the right and left side of vehicle at dummy nose level.



DRIVER
119

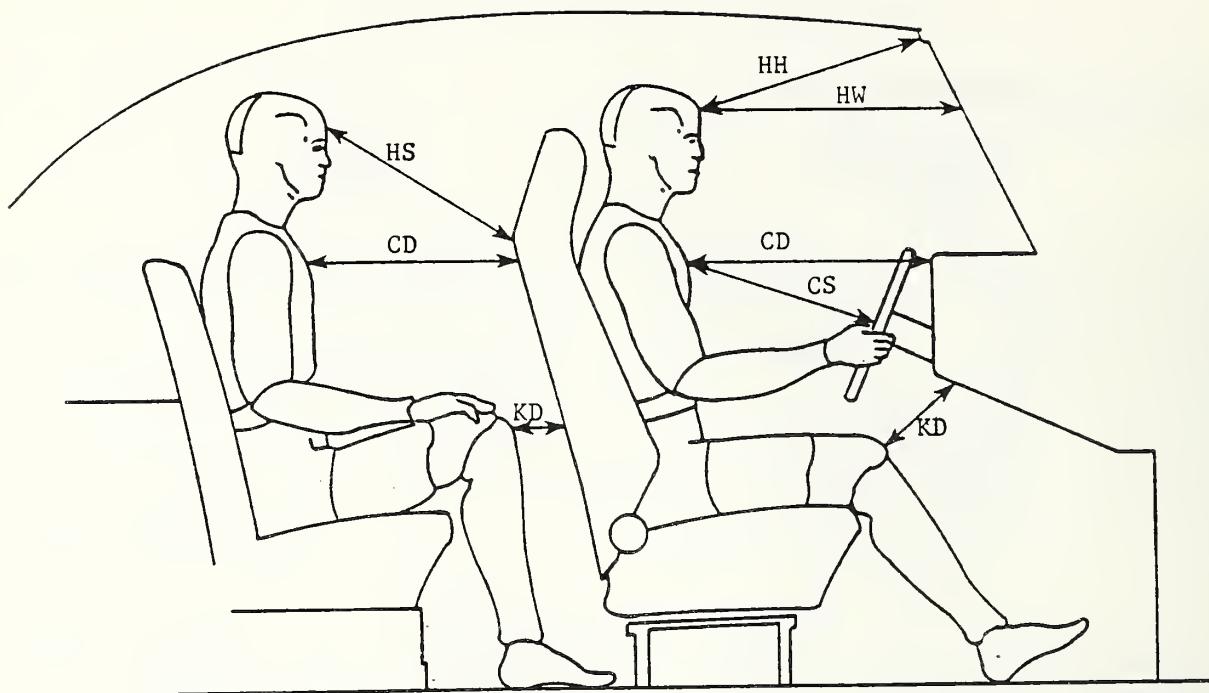
PASSENGER
016

HR	6.5	6.8
HS	8.5	8.3
AD	4.2	4.1
HD	6.3	6.1



ALL MEASUREMENTS IN INCHES

DUMMY LATERAL CLEARANCE DIMENSIONS



DRIVER
119

PASSENGER
016

HH	13.9	DNA
HW	18.1	DNA
HS	DNA	23.6
CD	19.6	18.1
CS	13.7	DNA
KDL	4.6	5.3
KDR	4.8	5.6

ALL MEASUREMENTS IN INCHES

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

SAE 3D H-POINT MACHINE LOCATION AND DUMMY LOCATION DATA

	DRIVER*	PASSENGER*
SAE 3D H-POINT MACHINE LOCATION:	X = -8.56 Z = 8.49	X = -41.56 Z = 8.42
DUMMY H-POINT LOCATION:	X = -8.75 Z = 8.04	X = -41.68 Z = 8.84
DUMMY HEAD LOCATION:	X = -16.56 Z = 34.75	X = -48.26 Z = 34.19
DUMMY HEAD ANGLE:	6°	-2°
DUMMY PELVIC ANGLE:	23°	24°
DUMMY H-POINT TO LEFT ANKLE BOLT DISTANCE:	29.5	27.8

*All location measurements referenced to left most front seat track bolt in two-dimensional rectangular coordinates: +X = forward, +Z = upward.

All dimensions in inches except as noted.

All angles referenced to horizontal, positive is upward.

DUMMY KINEMATIC SUMMARY

DRIVER

During impact, the dummy's torso contacted the driver's door and the head contacted the side window glass and the top of the barrier face. The dummy rebounded laterally across the front occupant compartment. The buttocks contacted the right front door inner panel, and the upper thorax contacted the right front window sill as the dummy's head grazed the right front seat head restraint and window sill. The dummy came to rest lying on its left side on the right front seat facing the driver's side.

PASSENGER

During impact, the dummy's torso contacted the left rear side wall and the head contacted the left side roof header and side window glass. The dummy rebounded laterally across the rear occupant compartment until its buttocks landed in the right rear section position. The right side of the upper torso contacted the right inner side wall. The dummy came to rest seated upright and facing forward.

VEHICLE EXTERIOR PROFILES AND STATIC CRUSH
ZERO DISTANCE AT PROJECTED IMPACT POINT*

LOCATION	HEIGHT (in)	6	0	6	12	18	24	30	36	42	48	54	60	66	72	78	
		PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)															
Axle Height	10.5	X	X	18.1	18.2	18.1	18.3	18.3	18.3	18.4	18.4	18.6	18.6	18.8	18.6	X	
H-Point	20.5	X	X	16.1	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.7	16.8	X
Mid Door	23.5	X	16.8	17.2	17.0	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	17.0	17.1	17.9	X
Window Sill	34.5	19.1	19.0	18.8	18.8	19.0	18.8	18.8	18.9	18.9	18.9	18.9	19.0	19.1	19.2	19.4	
Window Top	52.5	X	X	X	X	X	X	X	X	27.2	27.1	26.9	26.8	26.8	26.9	27.3	

POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE**)

3-13	Axle Height	10.5	X	X	23.6	27.4	27.5	27.5	27.3	27.1	27.5	26.6	25.6	24.3	X	X	
	H-Point	20.5	X	X	25.3	30.3	30.8	31.0	31.2	31.4	31.5	31.6	32.3	32.3	31.3	29.3	X
Mid Door	23.5	X	21.3	24.0	27.8	28.3	28.7	29.3	29.5	29.8	29.5	29.9	30.3	30.3	30.2	28.5	X
Window Sill	34.5	20.3	20.8	21.9	25.1	27.3	27.5	27.8	28.0	28.4	28.8	29.5	29.6	28.8	26.0	24.4	
Window Top	52.5	X	X	X	X	X	X	X	23.4	23.9	24.6	25.4	26.1	27.9	27.6	27.8	

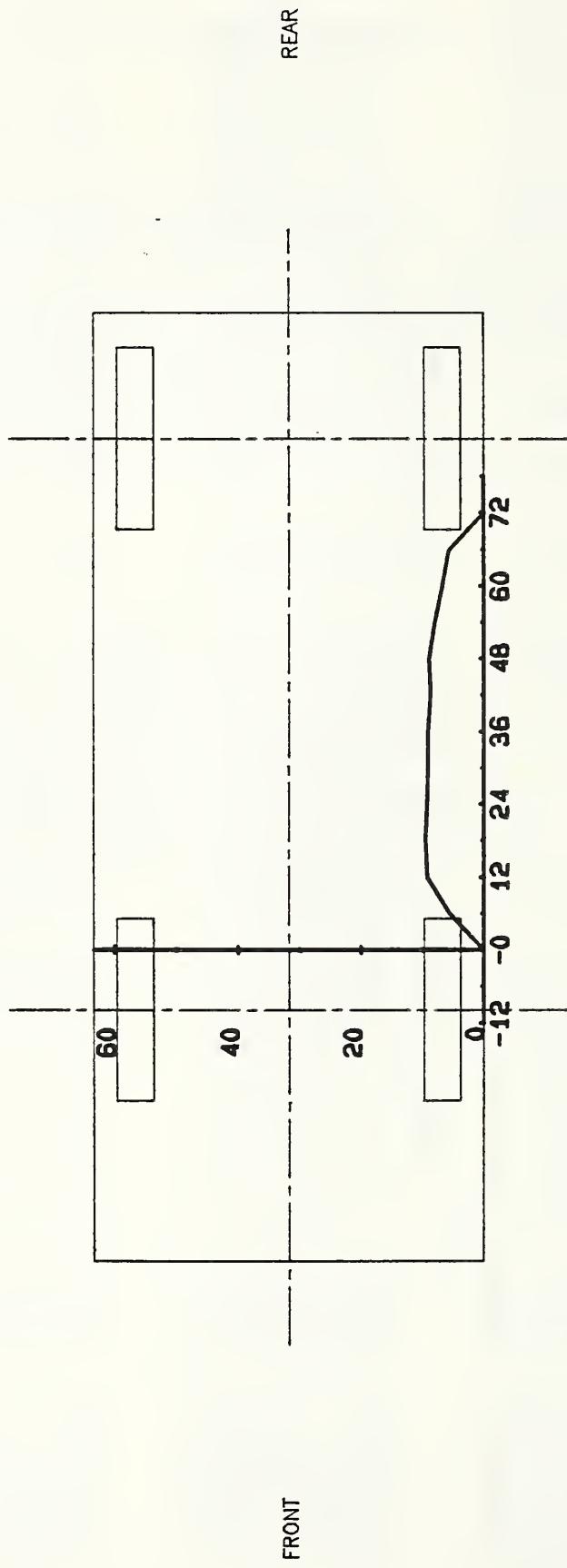
STATIC CRUSH (IN)

	Axle Height	10.5	X	X	5.5	9.2	9.4	9.2	9.1	9.0	8.7	8.9	8.0	6.8	5.7	X	X
	H-Point	20.5	X	X	9.2	13.7	14.2	14.4	14.6	14.8	14.9	15.0	15.7	15.7	14.6	12.5	X
Mid Door	23.5	X	4.5	6.8	10.8	11.4	11.8	12.4	12.6	12.9	12.6	13.0	13.3	13.3	13.1	10.6	X
Window Sill	34.5	1.2	1.8	3.1	6.3	8.3	8.7	9.0	9.1	9.5	9.9	10.6	10.6	9.7	6.8	5.0	
Window Top	52.5	X	X	X	X	-3.8	-3.2	-1.3	-1.4	0.7	1.1	0.7	0.7	0.7	0.5		

* Projected impact point is 37 inches forward of driver's side wheelbase midpoint. Column readings are front to rear from left to right.

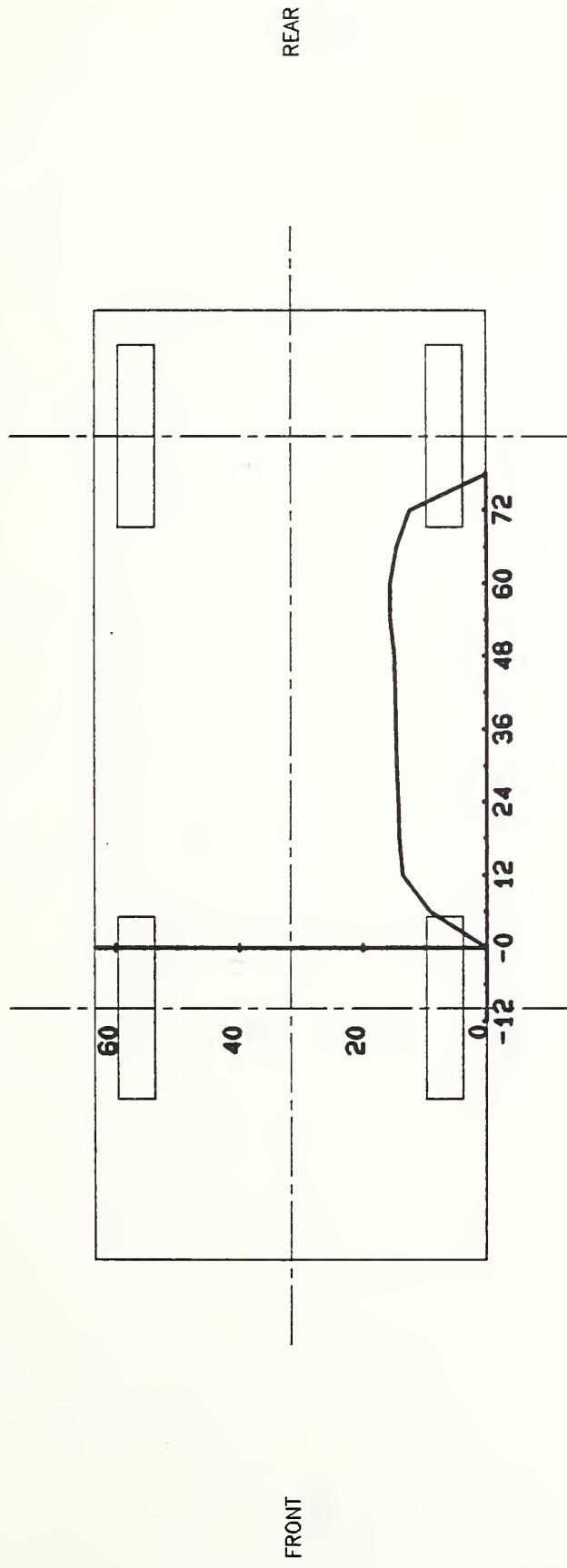
** Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

VEHICLE EXTERIOR STATIC CRUSH PROFILE



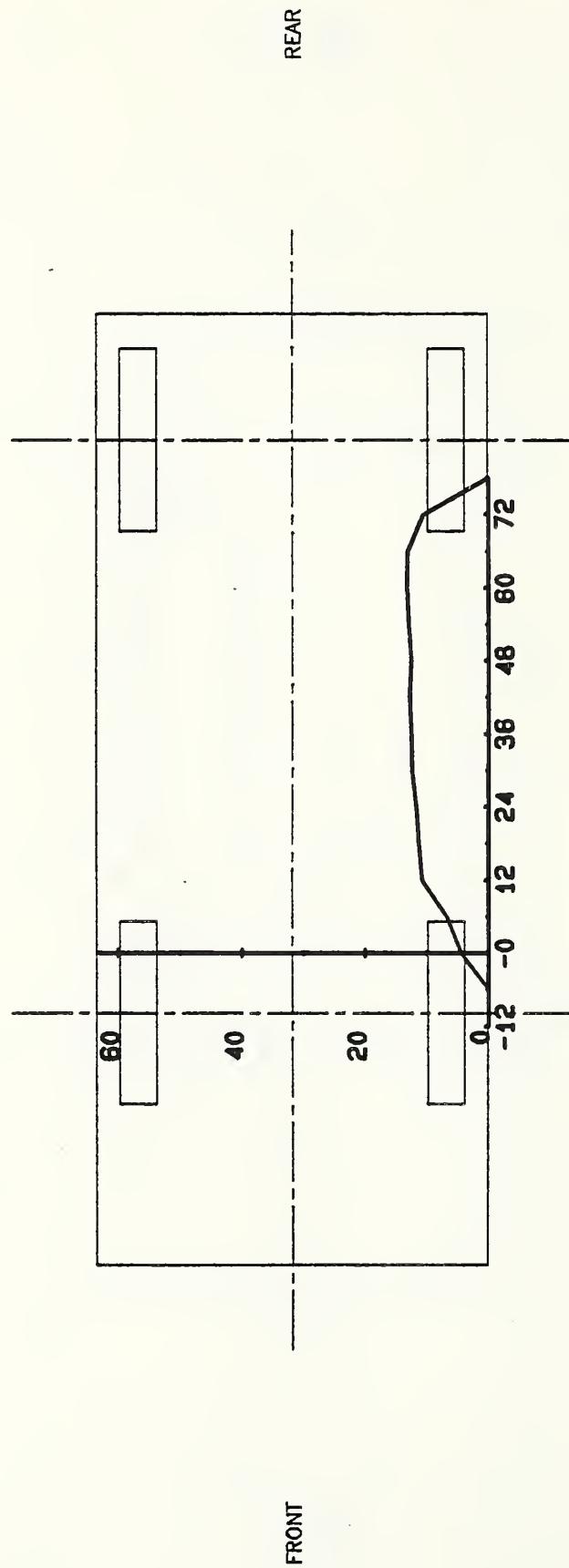
PROFILE LEVEL EQUALS AXLE HEIGHT WHICH IS 10.5" ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT
SCALE FACTOR EQUALS 0.036

VEHICLE EXTERIOR STATIC CRUSH PROFILE



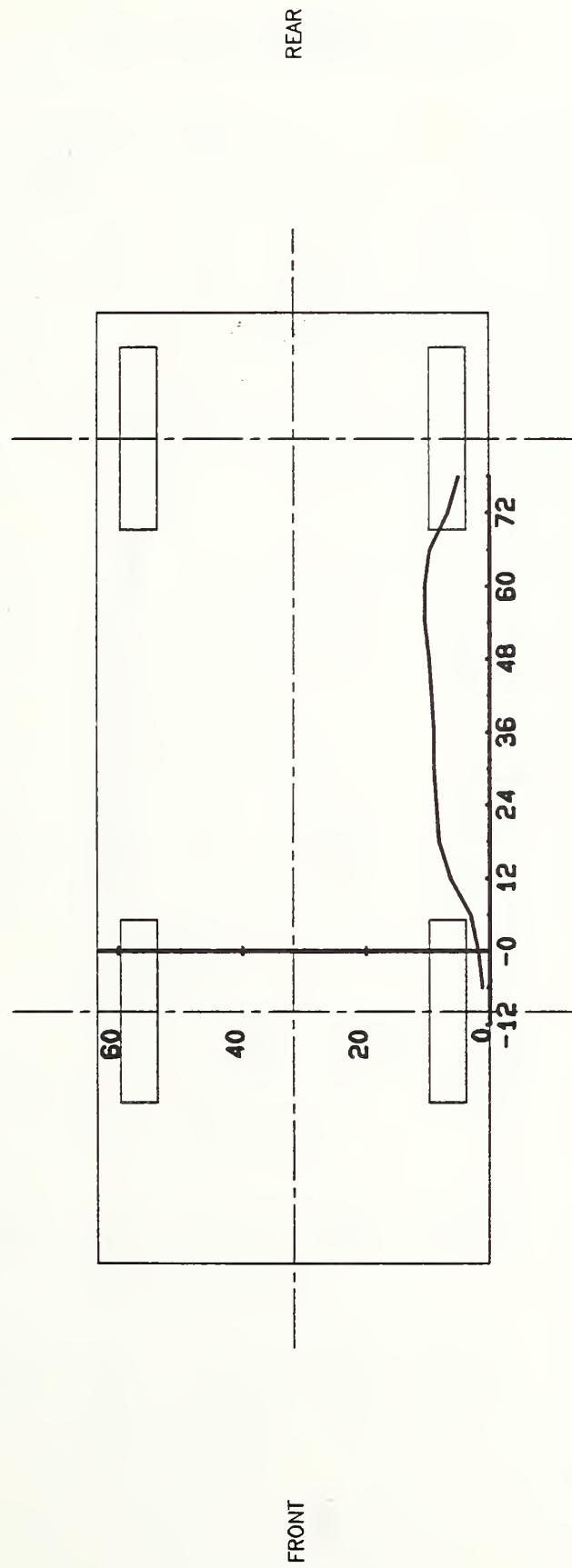
PROFILE LEVEL EQUALS H-POINT HEIGHT WHICH IS 20.5" ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT
SCALE FACTOR EQUALS 0.036

VEHICLE EXTERIOR STATIC CRUSH PROFILE



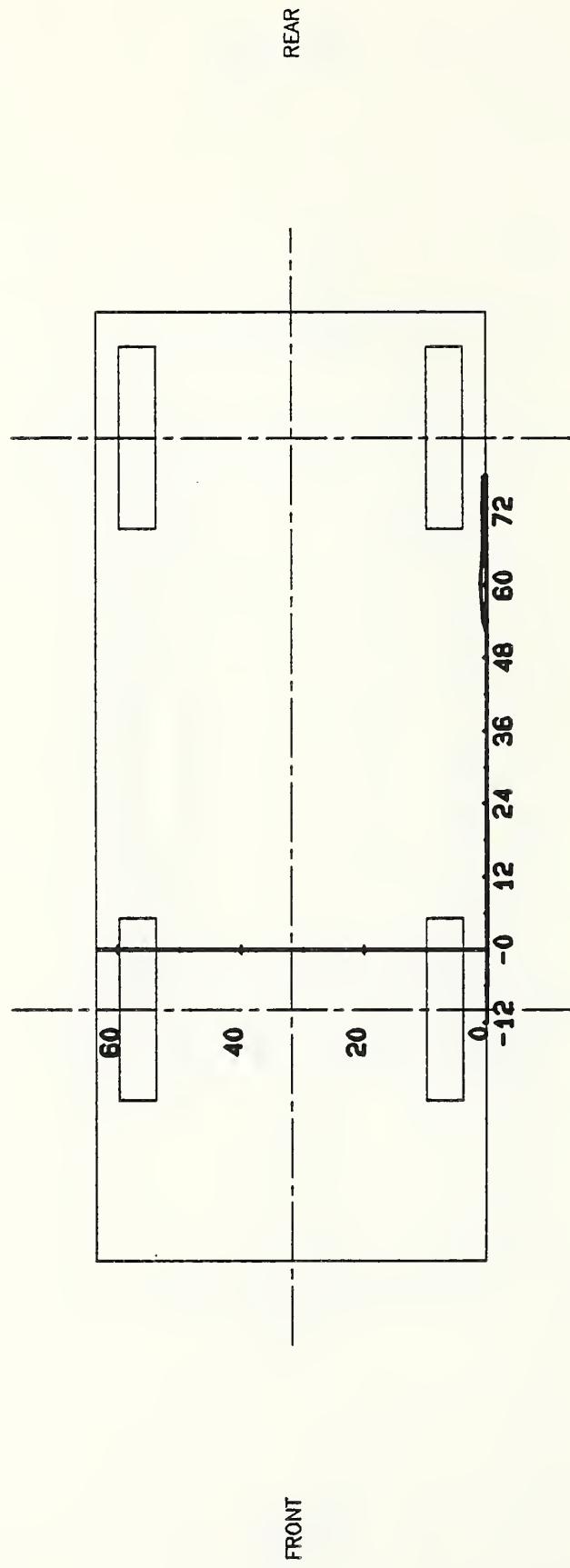
PROFILE LEVEL EQUALS MID DOOR HEIGHT WHICH IS 23.5" ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT
SCALE FACTOR EQUALS 0.036

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW SILL HEIGHT WHICH IS 34.5" ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT
SCALE FACTOR EQUALS 0.036

VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW TOP HEIGHT WHICH IS 52.5" ABOVE GROUND LEVEL
(0,0) EQUALS PROJECTED IMPACT POINT
SCALE FACTOR EQUALS 0.036

SIDE IMPACT DUMMY DATA SUMMARY

	DRIVER DUMMY				PASSENGER DUMMY							
	POSITIVE DIRECTION*		NEGATIVE DIRECTION**		POSITIVE DIRECTION*		NEGATIVE DIRECTION**					
	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)	MAX (g)	TIME (msec)				
HEAD ACCELERATION												
LONGITUDINAL	12.61	59.13	20.71	76.38	30.74	243.38	23.43	92.13				
LATERAL	54.65	50.75	22.07	61.25	45.51	56.38	26.66	243.50				
VERTICAL	36.25	47.88	62.01	62.75	10.33	27.25	53.08	69.50				
RESULTANT			63.97 @ 62.13			55.14 @ 57.38						
HIC	422.10	from 43.88 to 72.25 msec		308.03	from 56.25 to 71.25 msec							
CHEST ACCELERATION												
UPPER SPINE												
LONGITUDINAL	21.92	47.50	25.44	38.75	9.08	71.25	18.98	62.50				
LATERAL (P)***	111.47	39.38	60.92	66.25	70.46	40.63	20.36	62.50				
LATERAL (R)***	115.40	39.38	60.46	66.25	71.39	40.63	20.08	62.50				
VERTICAL	12.42	61.87	12.90	31.88	8.74	26.87	13.68	33.75				
RESULTANT (P)		114.31 @ 39.38 Y				71.55 @ 40.63						
RESULTANT (R)		118.16 @ 39.38 Y				72.46 @ 40.63						
DELTA V (MPH)****		27.5 @ 61.25 (P)				19.0 @ 60.00 (P)						
		29.7 @ 61.87 (R)				18.1 @ 60.00 (R)						
LOWER SPINE												
LONGITUDINAL	28.69	51.25	28.47	38.13	16.67	31.88	23.71	40.00				
LATERAL (P)	73.84	32.50	30.79	65.63	78.19	38.13	15.05	61.87				
LATERAL (R)	74.93	32.50	31.87	65.63	79.38	38.13	14.33	61.87				
VERTICAL	14.15	36.88	2.92	30.62	19.34	39.38	5.04	34.38				
RESULTANT (P)		74.06 @ 32.50				81.88 @ 38.13						
RESULTANT (R)		75.15 @ 32.50				83.02 @ 38.13						
DELTA V (MPH)		29.3 @ 61.87 (P)				26.7 @ 56.25 (P)						
		30.4 @ 62.50 (R)				28.4 @ 56.88 (R)						
LEFT UPPER RIB												
LATERAL (P)	94.11	32.50	22.39	77.50	97.32	33.75	15.25	39.38				
LATERAL (R)	99.82	32.50	22.97	77.50	97.23	34.38	24.91	39.38				
DELTA V (MPH)		24.7 @ 72.50 (P)				26.1 @ 82.50 (P)						
		26.2 @ 72.50 (R)				24.6 @ 81.88 (R)						
LEFT LOWER RIB												
LATERAL (P)	85.59	33.13	6.36	61.87	129.34	35.00	20.15	66.87				
LATERAL (R)	94.25	32.50	6.21	61.25	125.27	35.00	22.40	66.87				
DELTA V (MPH)		24.8 @ 70.00 (P)				27.9 @ 63.88 (P)						
		26.8 @ 71.25 (R)				27.0 @ 63.75 (R)						
PELVIS ACCELERATION												
LONGITUDINAL	13.91	45.63	14.47	38.25	14.23	26.38	35.66	34.75				
LATERAL	148.45	27.88	6.70	196.75	102.77	29.25	4.35	143.13				
VERTICAL	24.48	34.88	4.64	79.00	25.92	34.25	4.34	107.25				
RESULTANT		148.78 @ 27.88				103.26 @ 29.13						
DELTA V (MPH)		28.8 @ 122.13				27.3 @ 53.75						

SIDE IMPACT DUMMY DATA SUMMARY CONTD

	DRIVER DUMMY				PASSENGER DUMMY			
	POSITIVE DIRECTION*		NEGATIVE DIRECTION**		POSITIVE DIRECTION*		NEGATIVE DIRECTION**	
	MAX (in)	TIME (msec)	MAX (in)	TIME (msec)	MAX (in)	TIME (msec)	MAX (in)	TIME (msec)
RIB DEFLECTION	1.71	104.13	0.03	8.13	1.90	104.75	0.05	205.13

* LONGITUDINAL: FORWARD
 LATERAL: RIGHTWARD
 VERTICAL: UPWARD

**LONGITUDINAL: REARWARD
 LATERAL: LEFTWARD
 VERTICAL: DOWNWARD

*** (P) = Primary Sensor, (R) = Redundant Sensor

**** For dummy channels, Delta V is the velocity change at the approximate time of separation from the contact area.

Compression: Positive

Y See TEST ANOMALIES

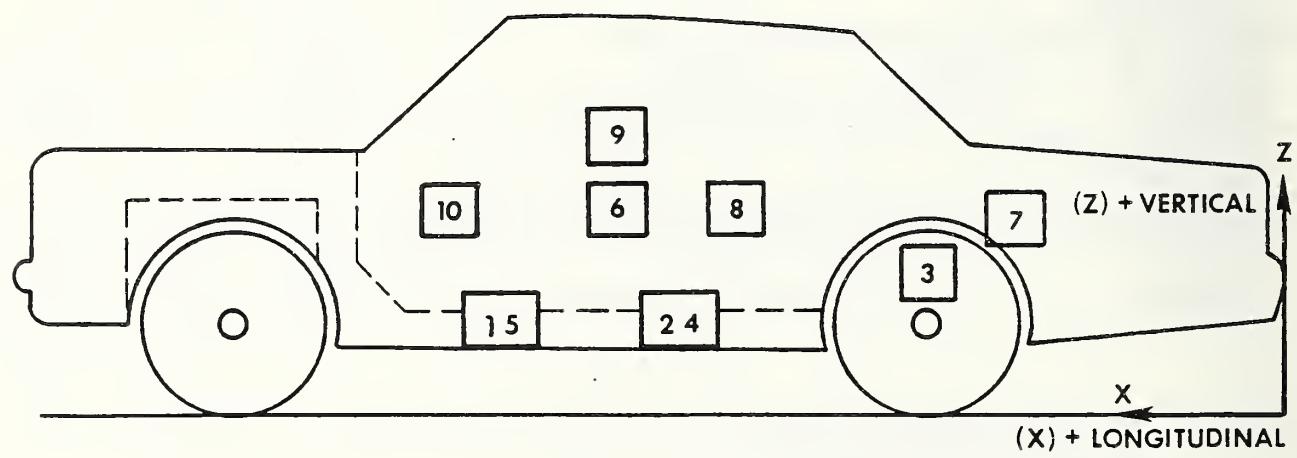
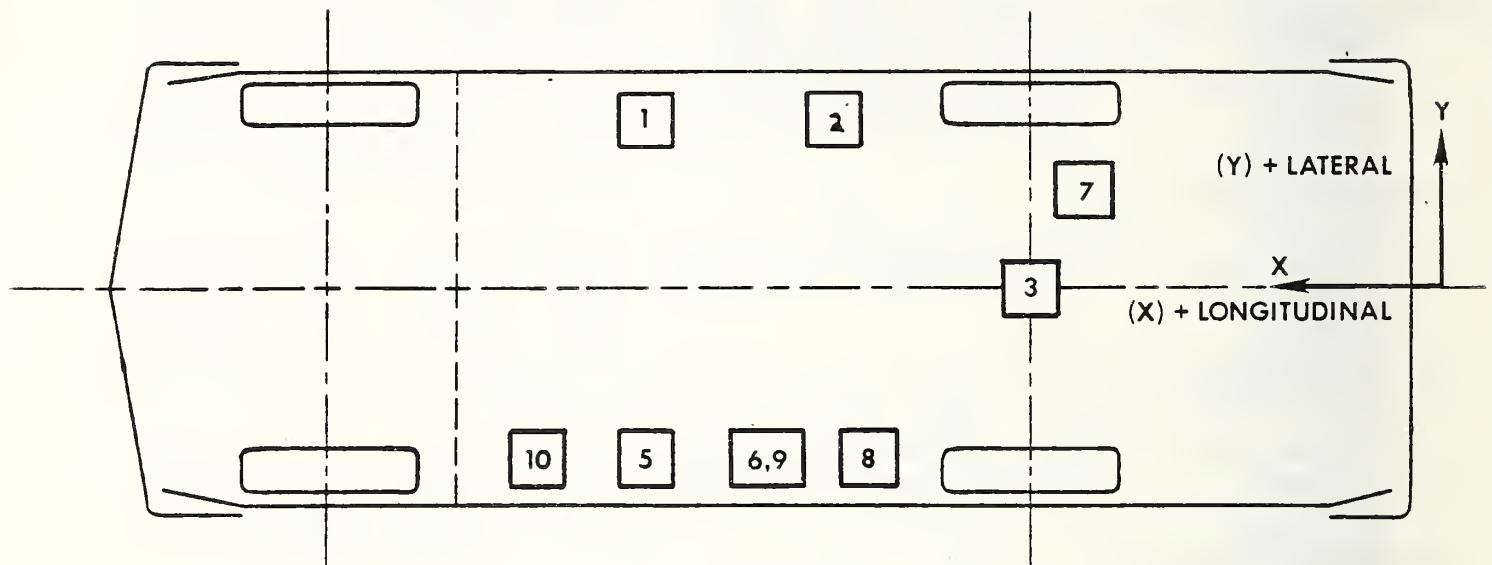
VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	RIGHT SILL AT FRONT SEAT (LONGITUDINAL)	89.5	25.5	9.9 $\Delta V = -0.6 \text{ mph} @ 110.00 \text{ msec}$ $\Delta V = 16.3 \text{ mph} @ 110.00 \text{ msec}$ $\Delta V = 19.3 \text{ mph} @ 110.00 \text{ msec}$	3.72	55.50	4.77	19.00
					18.39	51.88	3.86	140.50
					4.81	13.50	6.00	51.00
					19.30	@ 51.50		
2	RIGHT SILL AT REAR SEAT (LONGITUDINAL)	63.0	25.1	10.4 $\Delta V = -1.9 \text{ mph} @ 110.00 \text{ msec}$ $\Delta V = 19.3 \text{ mph} @ 110.00 \text{ msec}$	2.61	55.63	4.79	15.25
					24.09	51.00	4.32	132.25
					4.66	324.38	12.50	50.63
					27.11	@ 50.88		
3	REAR DECK OVER AXLE (LONGITUDINAL)	36.0	0.0	16.0 $\Delta V = -3.7 \text{ mph} @ 110.00 \text{ msec}$ $\Delta V = 21.6 \text{ mph} @ 110.00 \text{ msec}$	2.91	52.50	10.28	39.50
					24.47	50.50	3.76	139.38
					8.31	45.88	15.40	25.75
					24.70	@ 39.50		
4	LEFT SILL AT REAR SEAT (LATERAL)	65.9	-25.0	9.3 $\Delta V = 14.6 \text{ mph} @ 78.88 \text{ msec}$	63.70	9.25	31.15	14.75
5	LEFT SILL AT FRONT SEAT (LATERAL)	90.0	-25.2	9.3 $\Delta V = 16.2 \text{ mph} @ 47.63 \text{ msec}$	82.33	18.00	24.05	23.75
6	LEFT FRONT DOOR CENTERLINE (LATERAL)	83.8	-26.3	24.3 $\Delta V = 27.9 \text{ mph} @ 20.38 \text{ msec}$	156.68	12.88	143.25	26.38
7	RIGHT REAR COMPARTMENT (LONGITUDINAL)	33.6	15.5	16.5	5.21	28.88	7.17	22.63
8	MIDREAR OF LEFT FRONT DOOR (LATERAL)	75.5	-26.1	24.0 $\Delta V = 24.7 \text{ mph} @ 18.13 \text{ msec}$	166.01	11.50	65.10	26.63
9	UPPER LEFT FRONT DOOR CENTERLINE (LATERAL)	83.8	-26.3	29.1 $\Delta V = 22.4 \text{ mph} @ 23.38 \text{ msec}$	72.08	14.25	104.77	29.13
10	MIDREAR OF LEFT FRONT DOOR (LATERAL)	92.3	-26.5	24.3 $\Delta V = 11.9 \text{ mph} @ 11.75 \text{ msec}$	104.31	11.88	65.71	41.50

* Reference: X - Rear Bumper (+ Forward), Y - Vehicle Centerline (+ To Right),
Z - Ground Level (+ Up)

All measurements of accelerometer locations in inches.

VEHICLE ACCELEROMETER LOCATIONS



YAW RATE GYRO LOCATION AND DATA SUMMARY

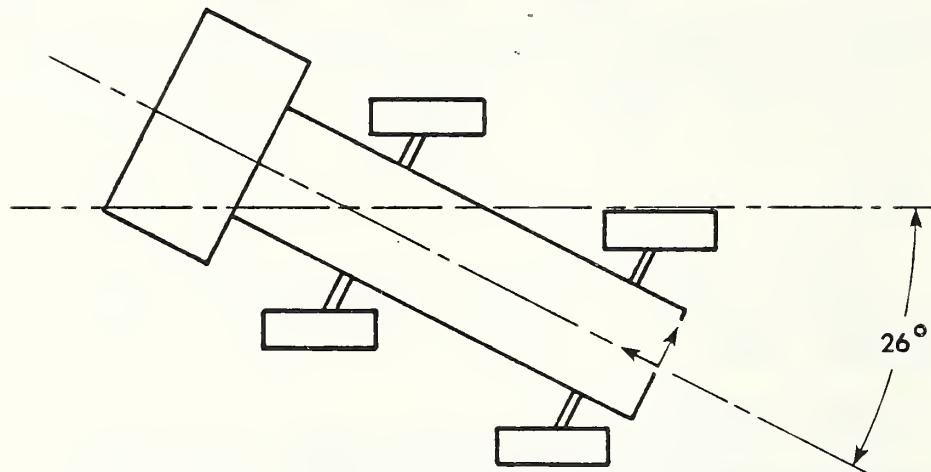
LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
				MAX (deg/sec)	TIME (msec)	MAX (deg/sec)	TIME (msec)
YAW RATE GYRO	81.0	0.0	17.1	19.58	19.63	109.04	34.50

*Reference: X - Rear Bumper (+ forward), Y - Vehicle Centerline (+ to right),
Z - Ground Level (+ up)

All measurements of rate gyro in inches.

Yaw rotation is positive when measured counterclockwise as viewed from above.

MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY



NO.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX (g)	TIME (msec)	MAX (g)	TIME (msec)
1	CENTER OF GRAVITY (LONGITUDINAL)	73.5	0.0	12.8				
	(LATERAL)	$\Delta V = -17.3$ mph @ 110.00 msec			0.24	127.38	14.70	35.00
	(VERTICAL)	$\Delta V = -4.6$ mph @ 110.00 msec			1.29	59.38	6.36	44.00
	(RESULTANT)				2.93	105.63	3.67	27.63
						15.52 @ 44.50		
2	REAR FRAME MEMBER (LONGITUDINAL)	19.4	-18.5	12.7				
	(LATERAL)	$\Delta V = -15.1$ mph @ 110.00 msec			2.11	145.75	16.55	35.25
		$\Delta V = -0.1$ mph @ 110.00 msec			2.16	16.88	1.79	202.38

* Reference: X - Rear Most Point of Frame (+ To Forward), Y - Barrier Centerline (+ To Right), Z - Ground Level (+ To Up)

All measurements of accelerometer locations in inches.

CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Onboard MDB - Tight	Photosonic 1B	25	498	Closeup of Impact Point
2	Onboard MDB - Wide	Photosonic 1B	13	500	Dummy Kinematics
3	Overhead - Tight	Photosonic 1B	25	500	Closeup of Impact Point
4	Overhead - Wide	Photosonic 1B	8	500	Vehicle Dynamics
5	Ground Level - Right	Photosonic 1B	25	502	Overall View
6	Ground Level - Left	Photosonic 1B	17	500	Overall View
7	Onboard Windshield	Photosonic 1B	8	615	Driver Kinematics - Front View
8	Onboard Rood	Photosonic 1B	8	887	Door/Driver Contact Velocity
9	Onboard Driver	Photosonic 1B	8	702	Driver Kinematics
10	Onboard Passenger	Photosonic 1B	8	907	Passenger Kinematics

LOCATIONS OF OFFBOARD HIGH SPEED CAMERAS

CAMERA NO.	X	Y	Z
1	0	0	25'
2	0	0	25'
5	24'10"	58'8"	45"
6	-20'11"	-13'	45"

Origin of Coordinate System is Point of Impact

+X = Forward with Respect to Striking Vehicle's Velocity Vector
+Y = Rightward with Respect to Striking Vehicle's Velocity Vector
+Z = Upward with Respect to Striking Vehicle's Velocity Vector

NON-GOVERNMENT FURNISHED TRANSDUCER INFORMATION

PARAMETER BEING MEASURED	TYPE OF TRANSDUCER	MODEL NUMBER	SERIAL NUMBER	MFGR.	DATE OF LAST CALIBRATION	SENSITIVITY	DESIRED FULL SCALE (ENGR. UNITS)
BOGXG	Accel	4-202-0001	18851	Bell Howell	6/17/85	.241 MV/G	50 G
BCCYG	Accel	4-202-0001	18859	Bell Howell	6/17/85	.238 MV/G	50 G
BGGZG	Accel	4-202-0001	18847	Bell Howell	6/17/85	.246 MV/G	50 G
BFCXG	Accel	4-202-0001	18240	Bell Howell	6/12/85	.240 MV/G	50 G
BRCXG	Accel	4-202-0001	19022	Bell Howell	6/12/85	.222 MV/G	50 G

All dummy and struck vehicle accelerometers were Government Furnished Equipment and were Endevco 2264 Accelerometers.



APPENDIX A
PHOTOGRAPHS

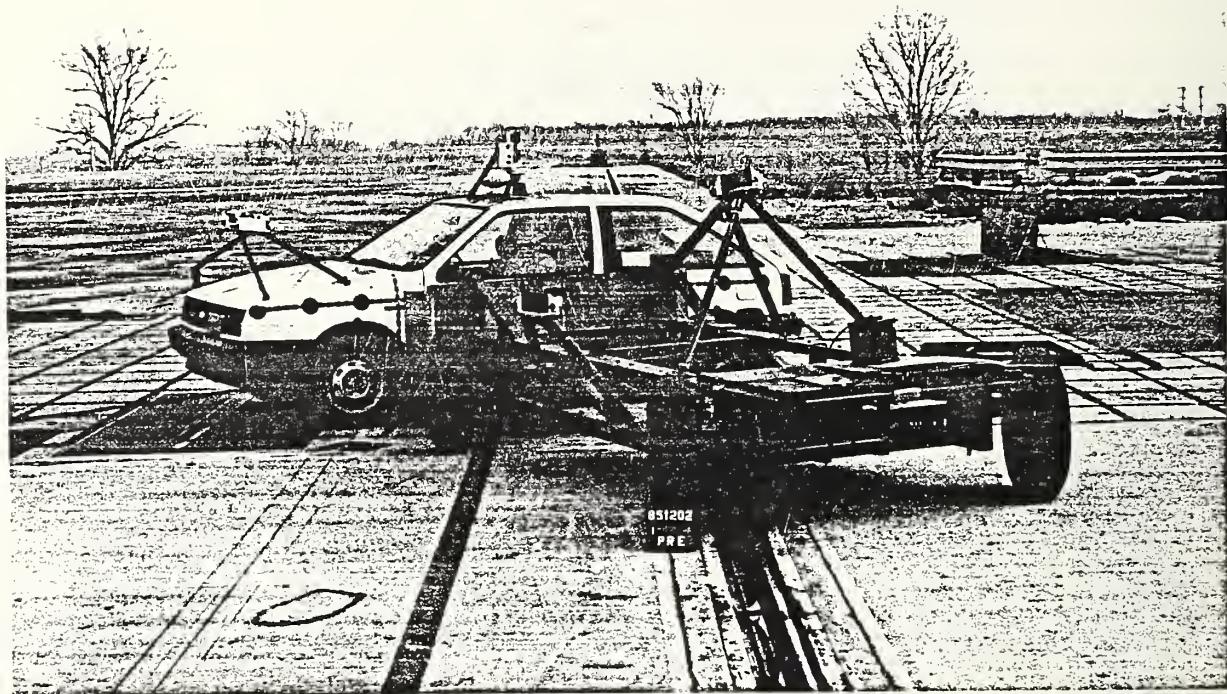


Figure A-1. PRE-TEST OVERALL - VIEW 1



Figure A-2. PRE-TEST OVERALL - VIEW 2
A-2



Figure A-3. PRE-TEST OVERALL - VIEW 3



Figure A-4. PRE-TEST OVERALL - VIEW 4
A-3

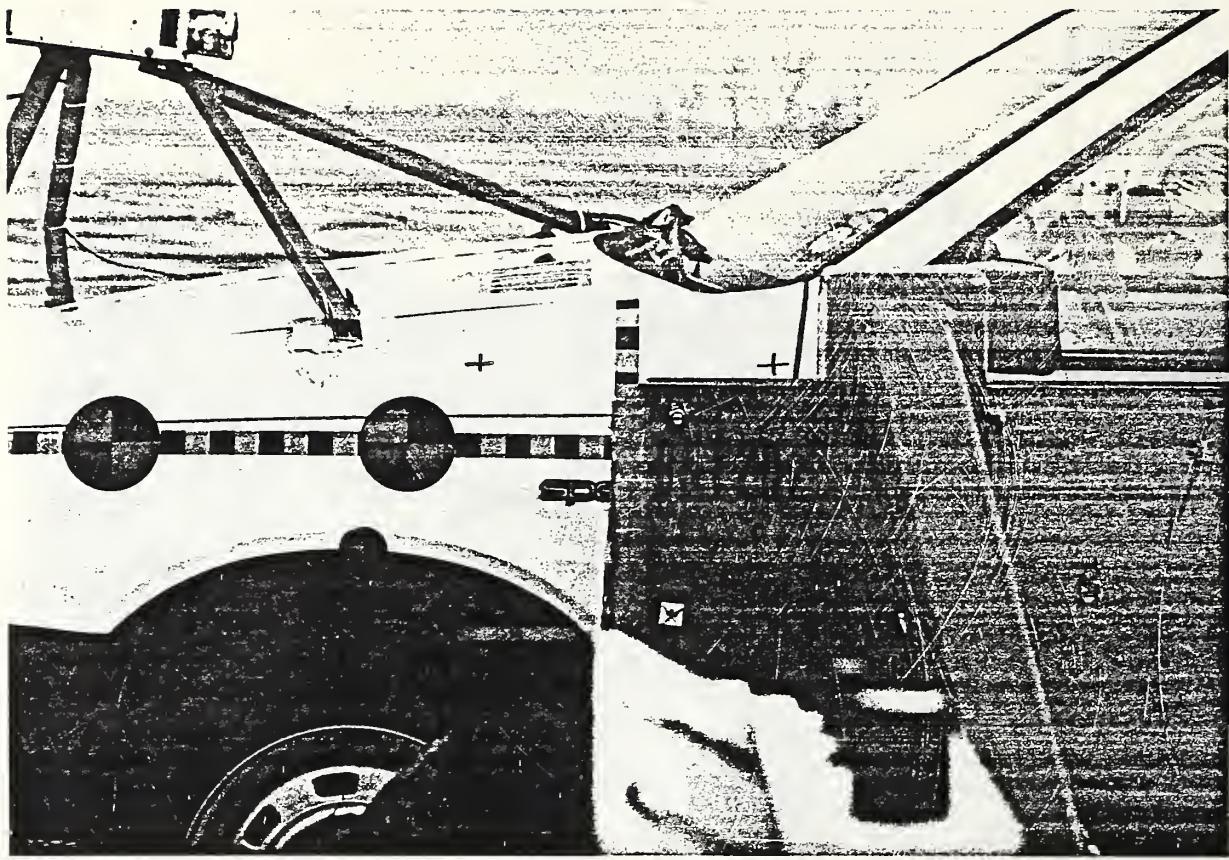


Figure A-5. PRE-TEST CLOSEUP - VIEW 1

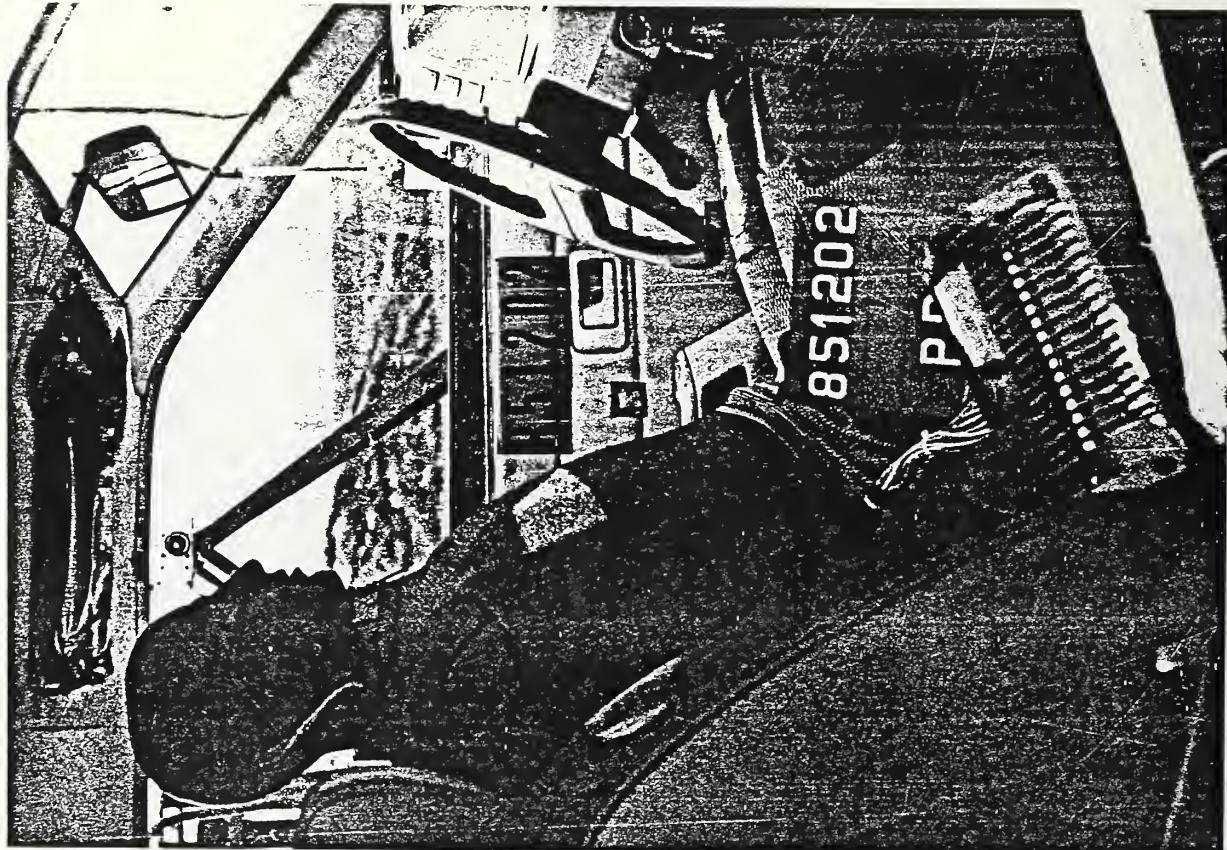


Figure A-6. PRE-TEST DRIVER DUMMY VIEW
A-4



Figure A-7. PRE-TEST PASSENGER DUMMY - VIEW 1



Figure A-8. PRE-TEST PASSENGER DUMMY - VIEW 2



Figure A-9. POST-TEST OVERALL - VIEW 1

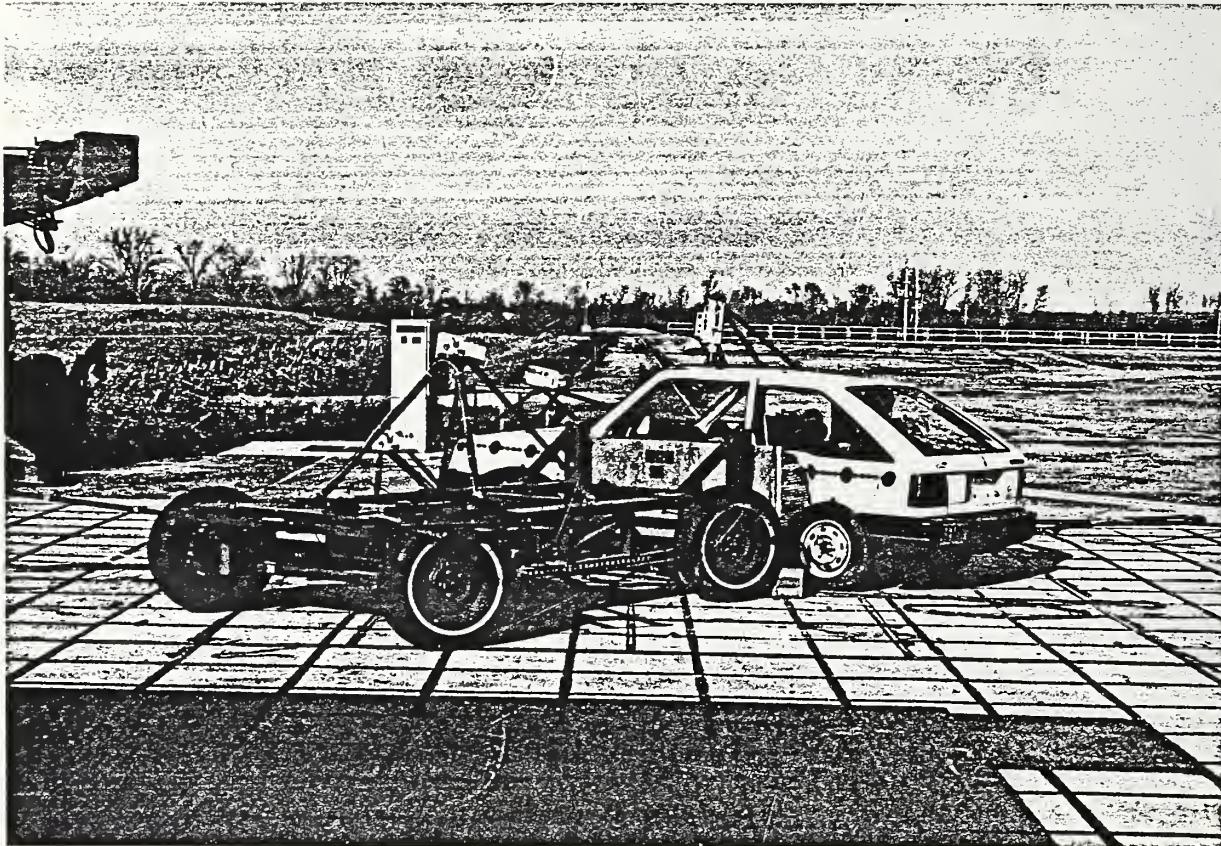


Figure A-10. POST-TEST OVERALL - VIEW 2
A-6

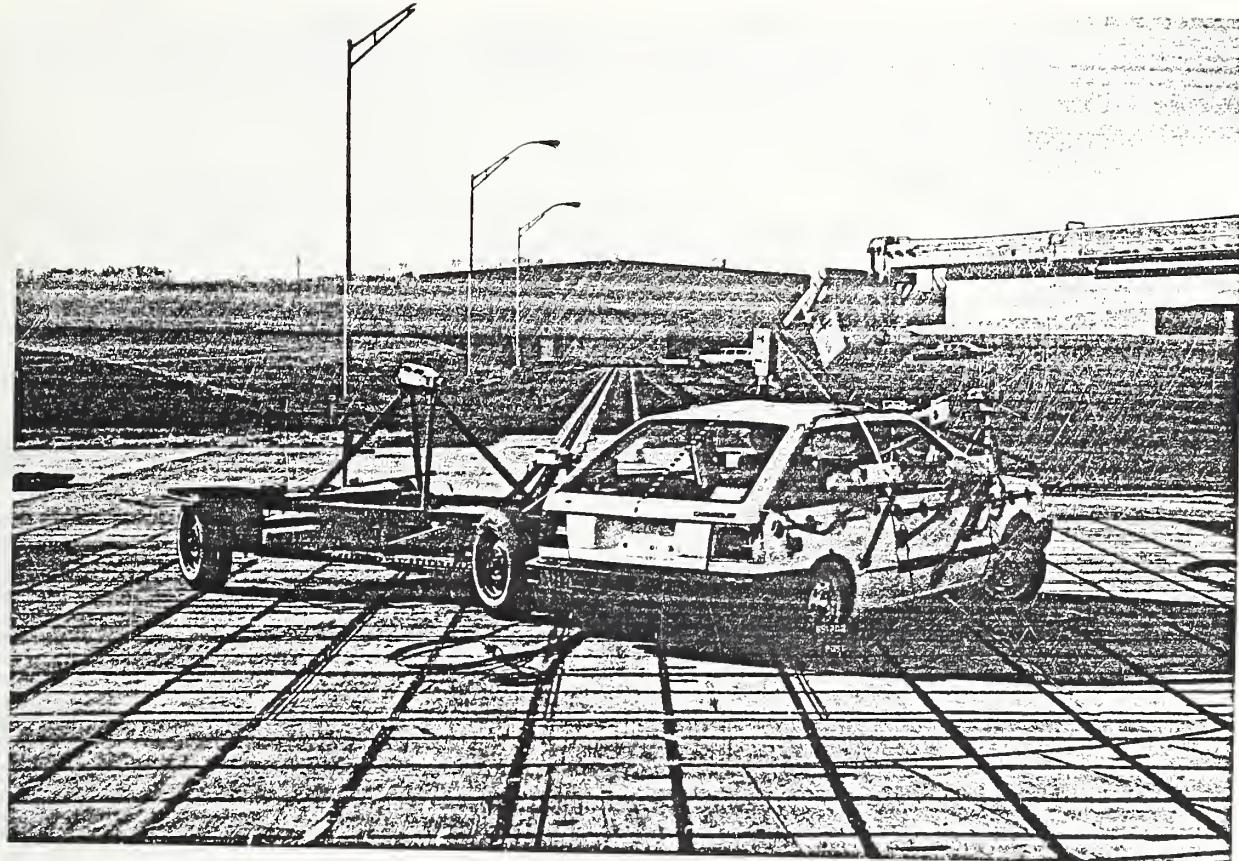


Figure A-11. POST-TEST OVERALL - VIEW 3

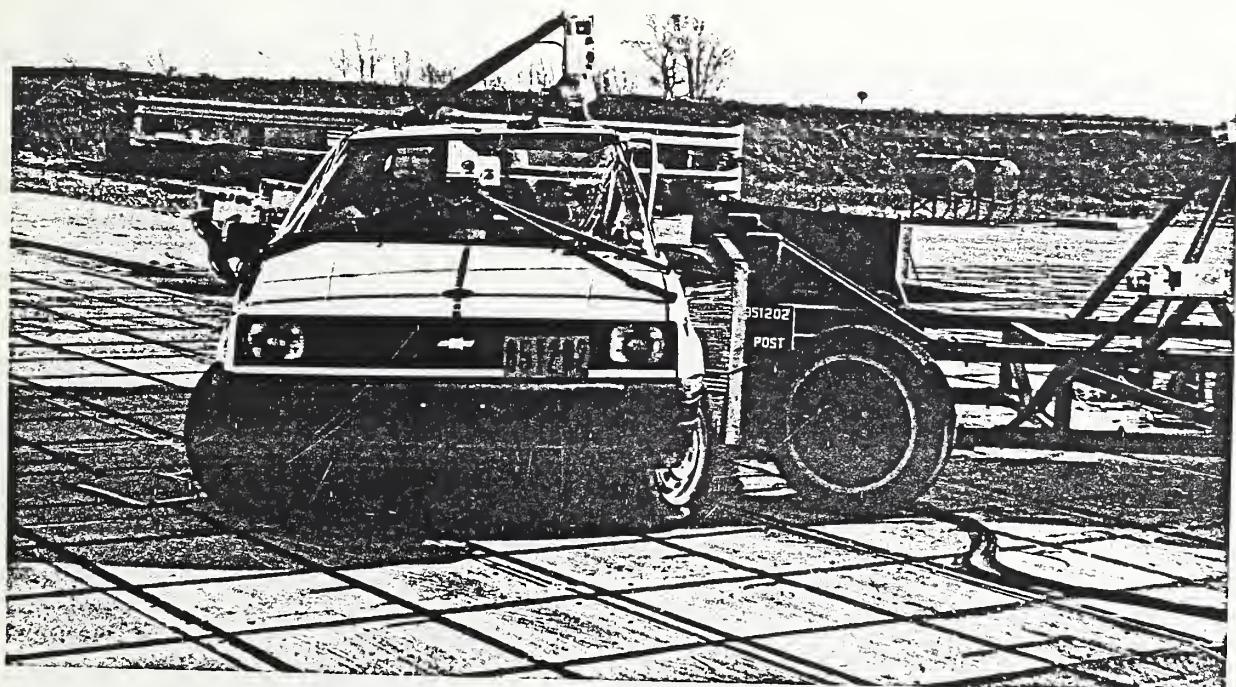


Figure A-12. POST-TEST OVERALL - VIEW 4



Figure A-13. POST-TEST DRIVER DUMMY VIEW



Figure A-14. POST-TEST PASSENGER DUMMY VIEW

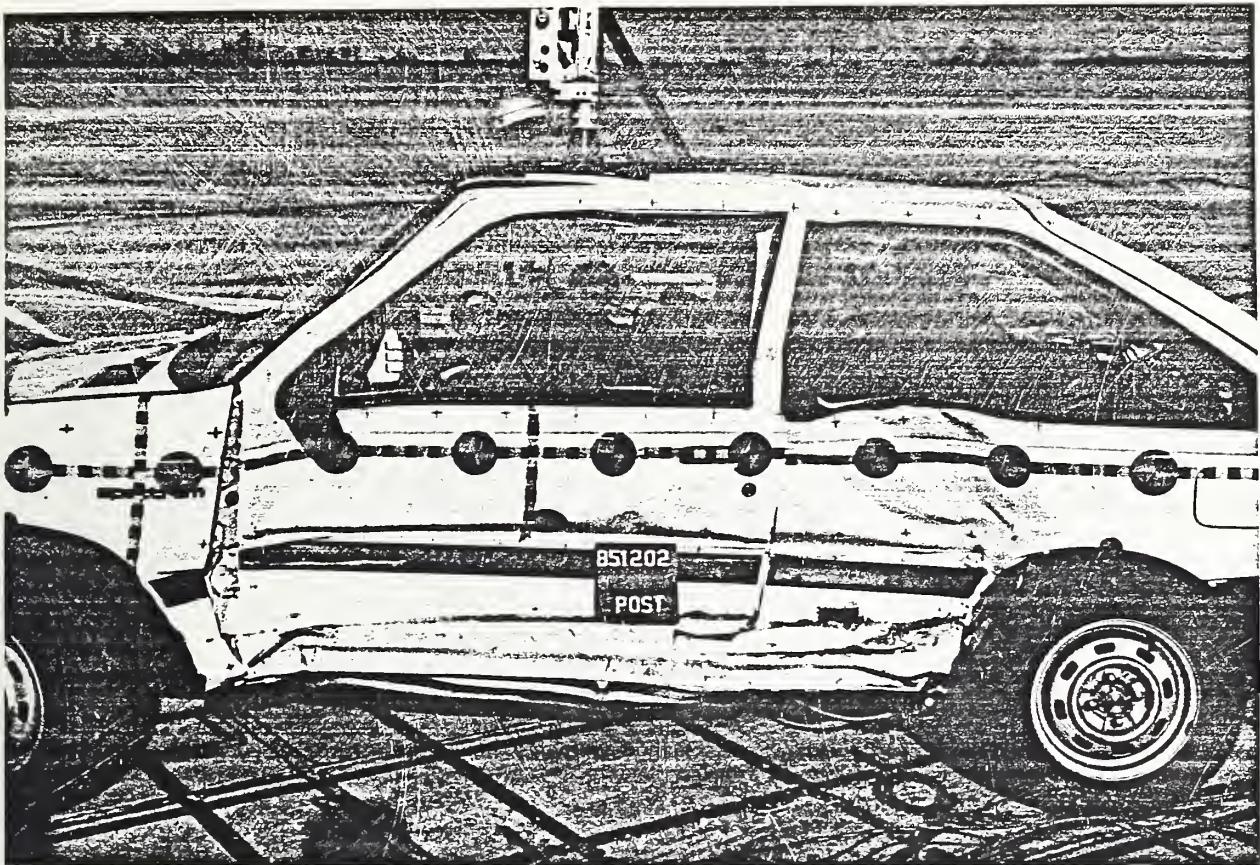


Figure A-15. POST-TEST VEHICLE DAMAGE VIEW

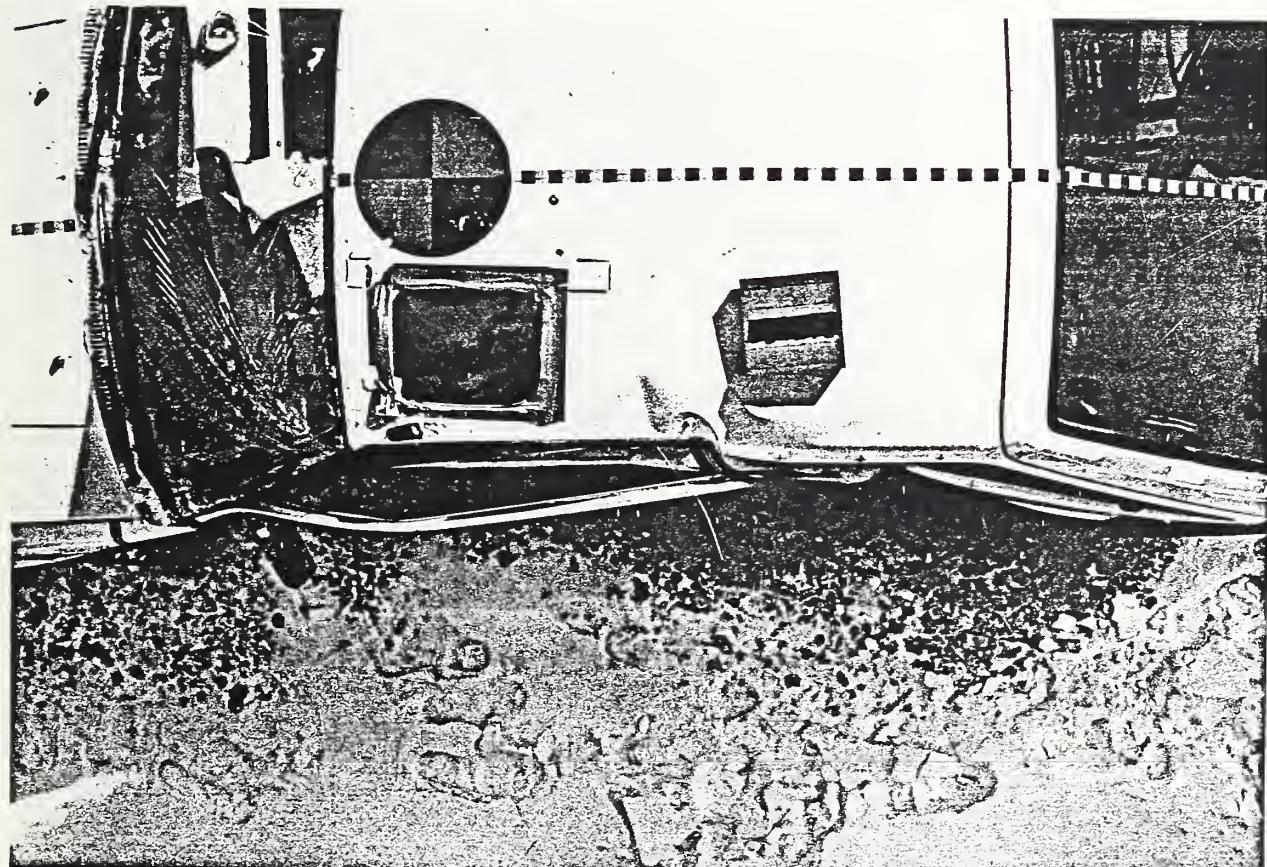


Figure A-16. POST-TEST OVERHEAD VIEW

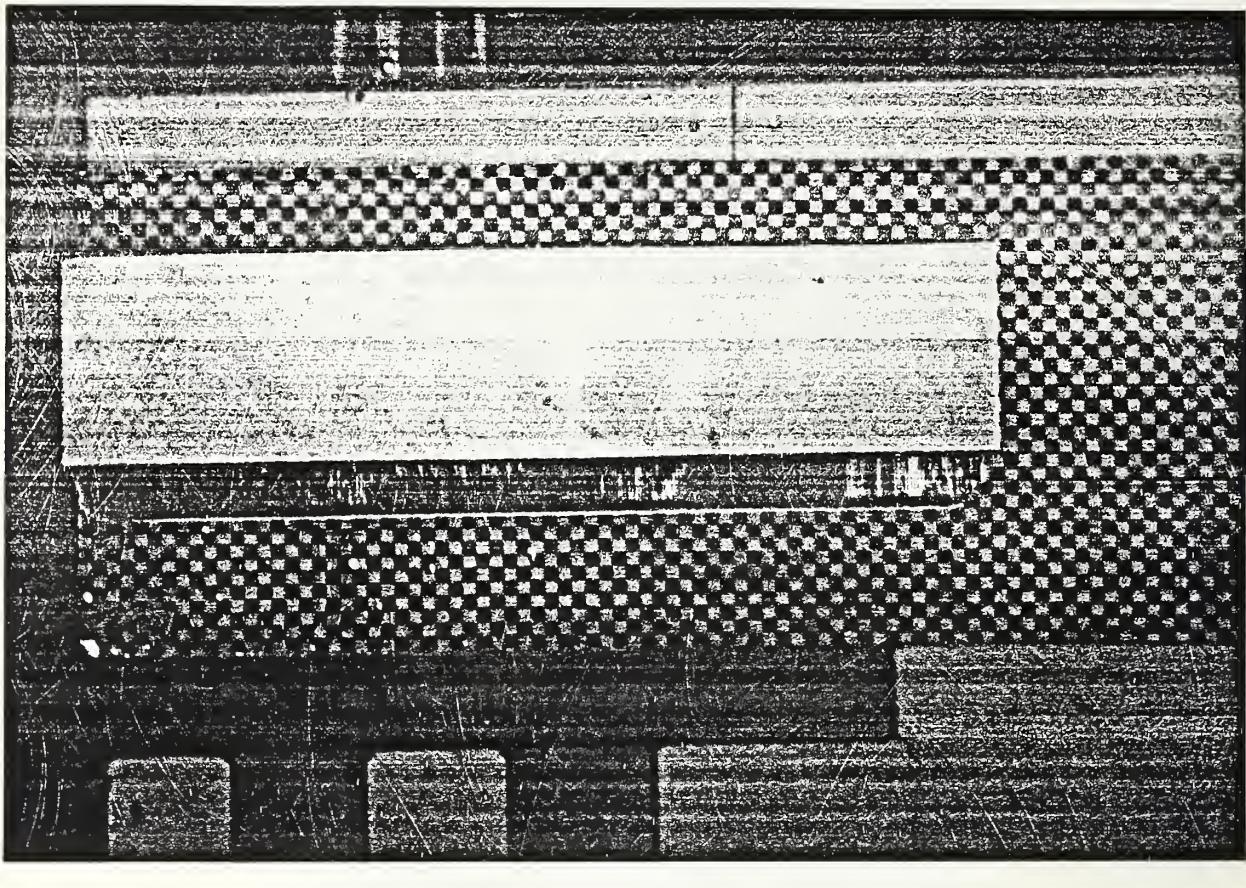


Figure A-17. PRE-TEST MDB FACE - VIEW 1

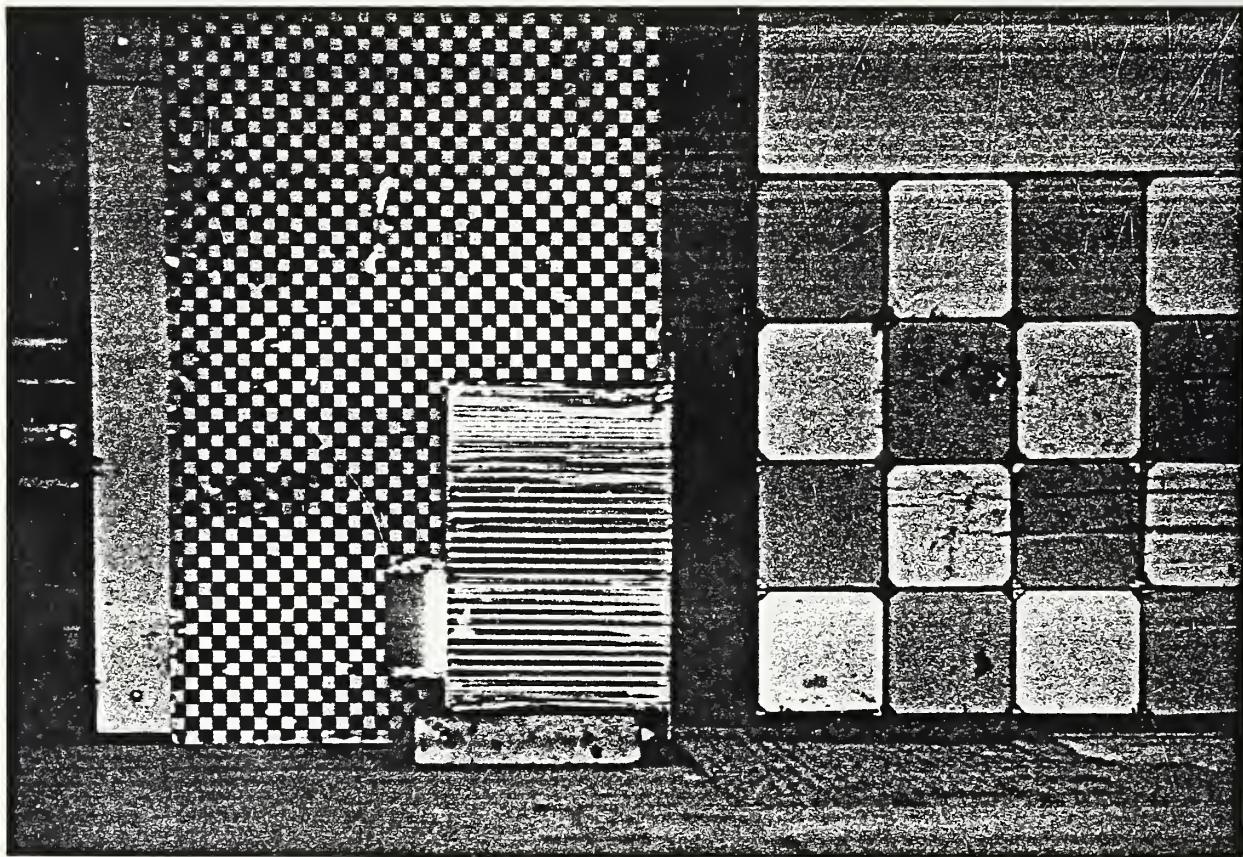


Figure A-18. PRE-TEST MDB FACE - VIEW 2

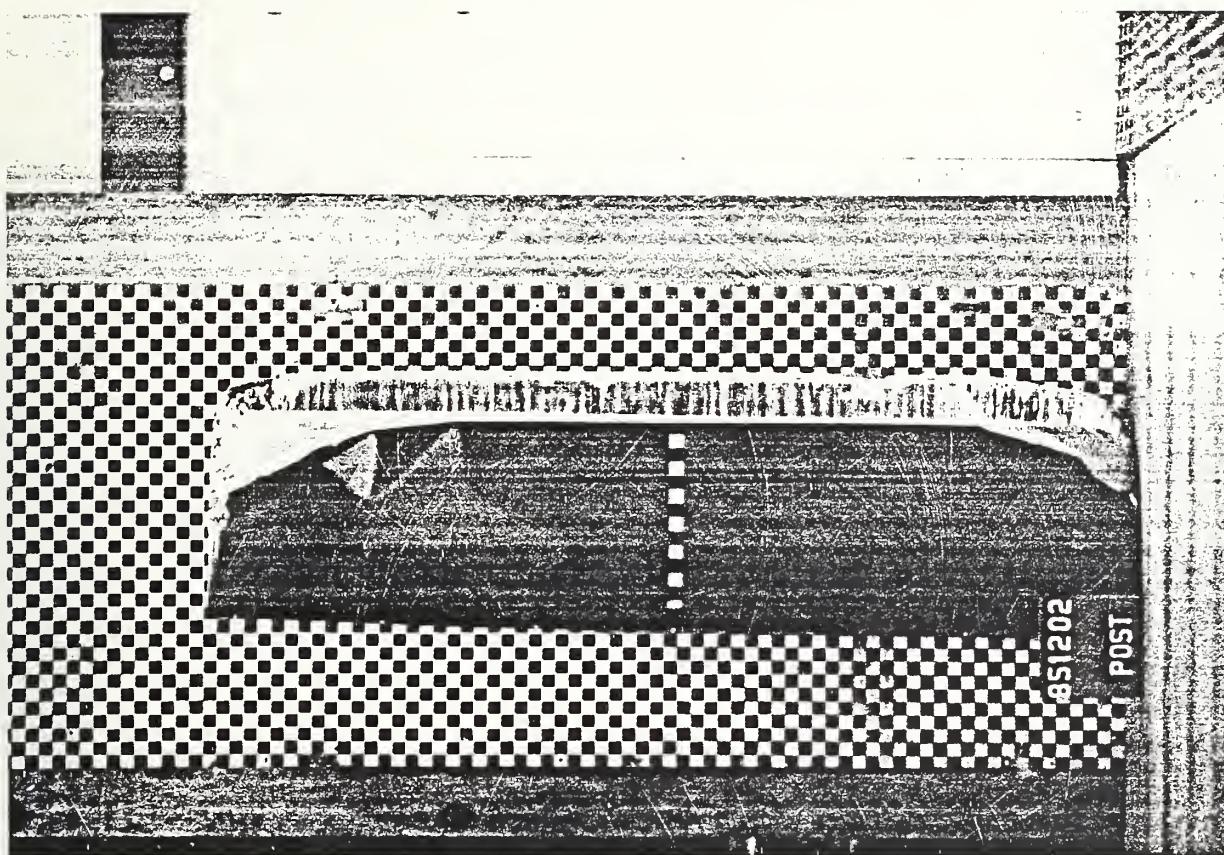


Figure A-19. POST-TEST MDB FACE - VIEW 1

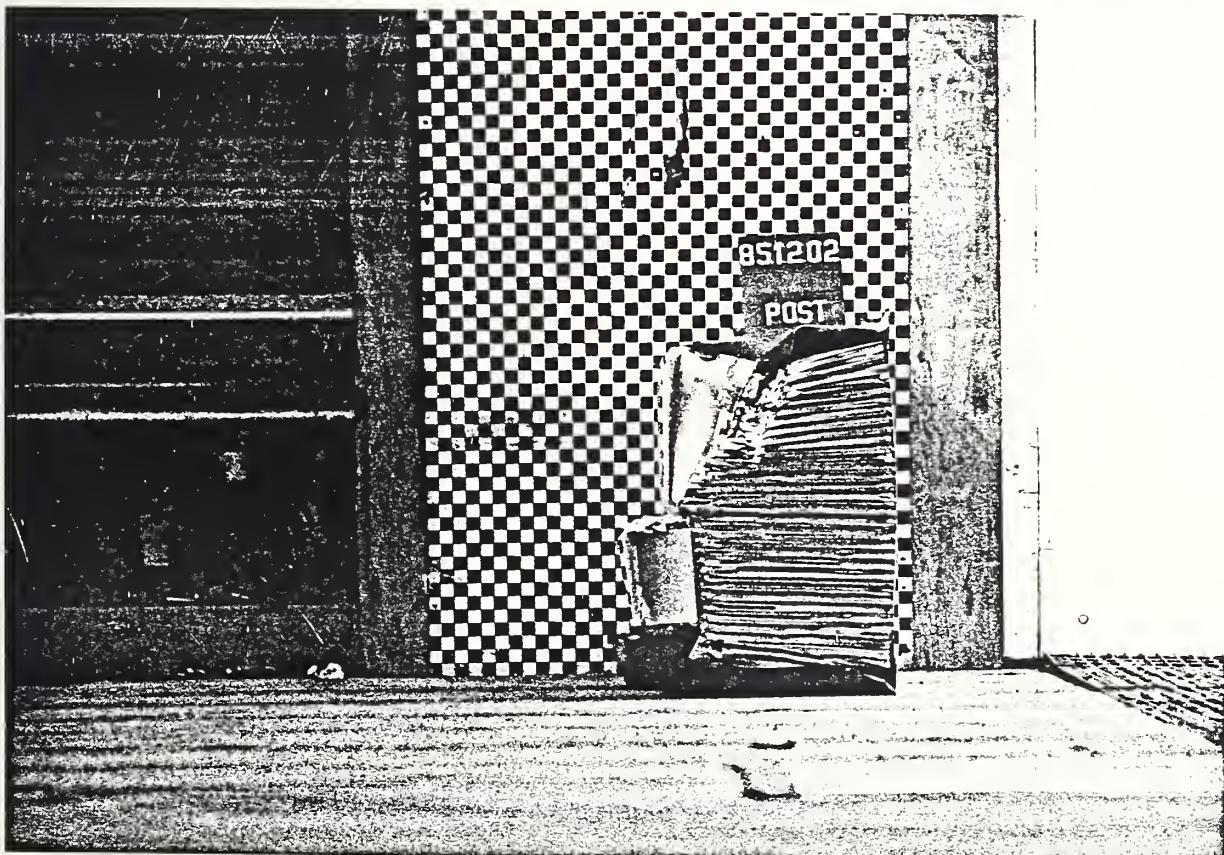


Figure A-20. POST-TEST MDB FACE - VIEW 2



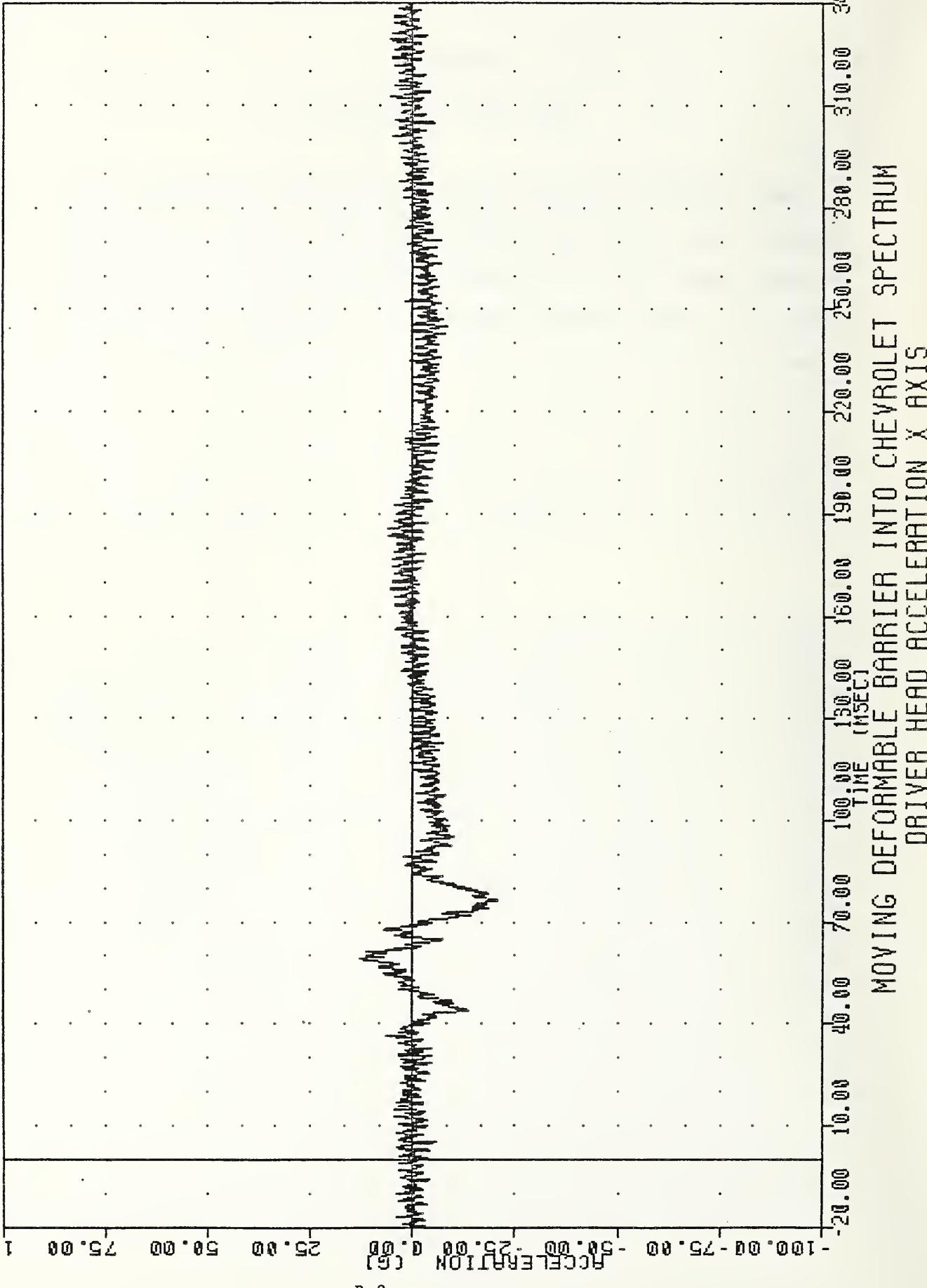
APPENDIX B
DATA PLOT PRESENTATION

Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data were filtered according to SAE J211, except that dummy thorax data were filtered using the HSRI filter.

YRT , 851202
SI PROTECTION PROD VEHICLE
85336000000
HEDXG1

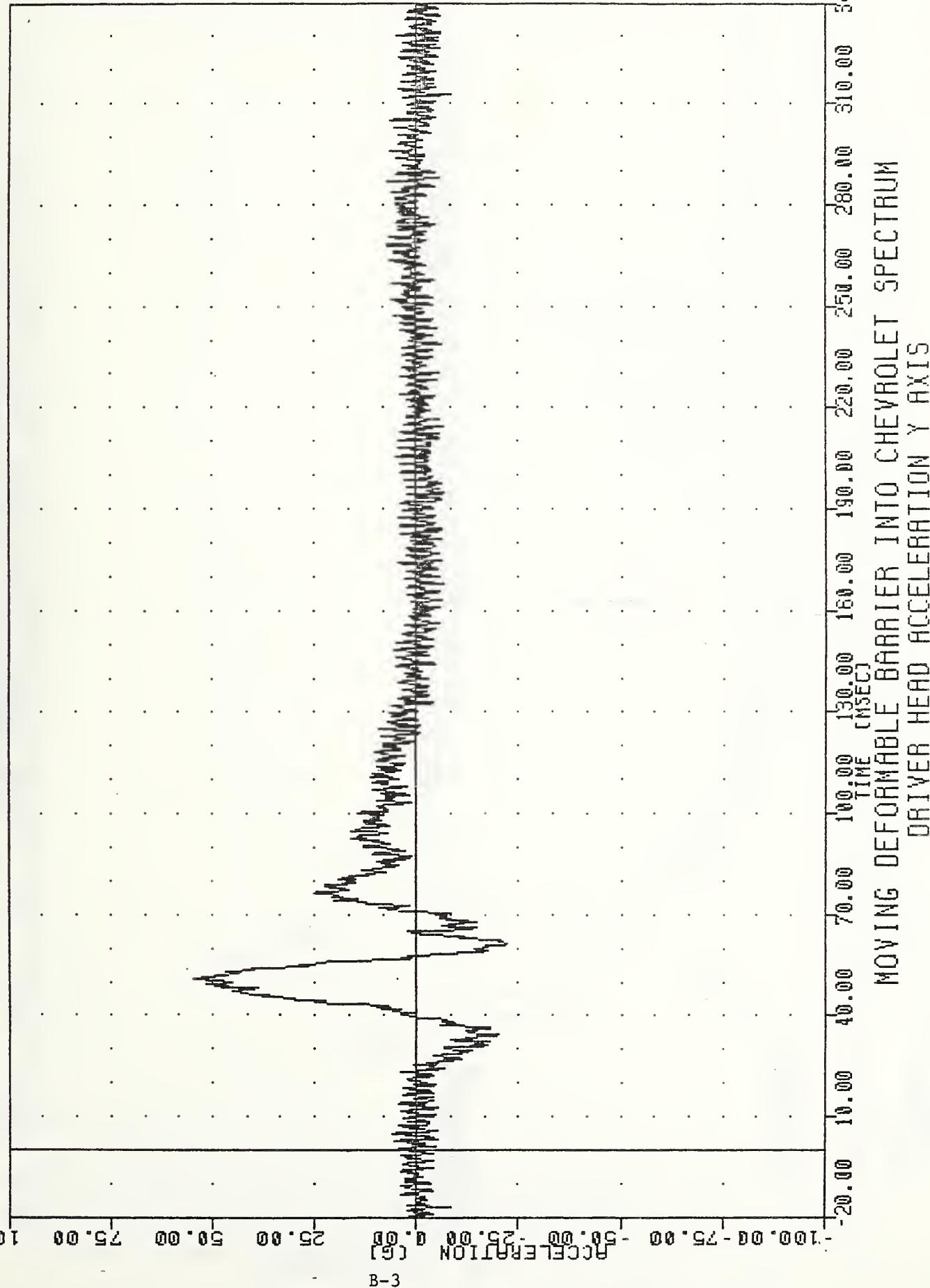
PLOT DATE 10-DEC-85 09:11:45

FILTER = ALPF 1650/ 5217/-40
MIN. MAX VALUES = -20.718 76.38 , 12.61 & 59.13



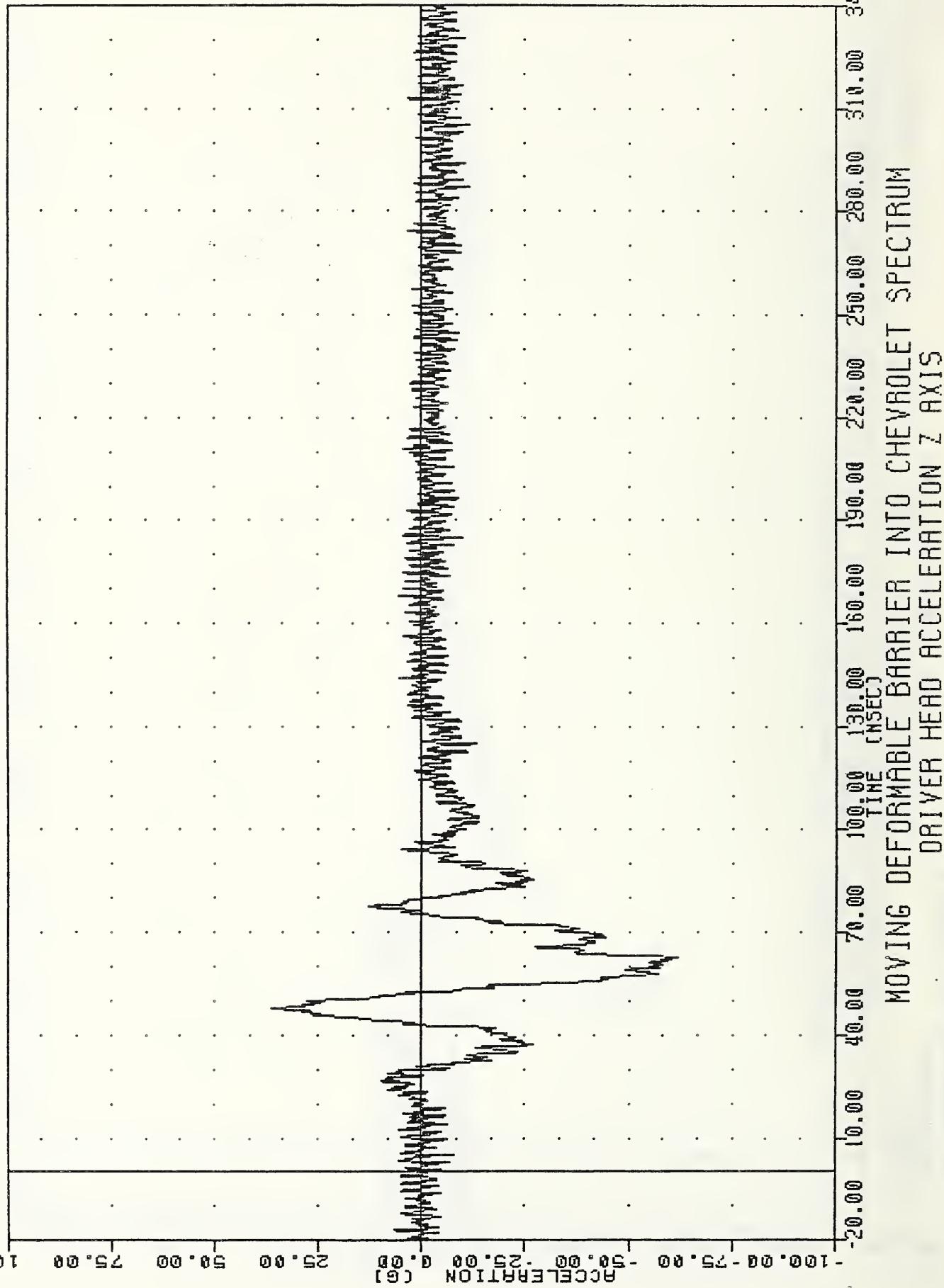
VRT
SI PROTECTION PROOF VEHICLE
85360000000
HE0Y61

PLOT DATE 10-DEC-85 09:11:45
FILTER = ALPF 1650/ 5217/-40
MIN, MAX VALUES = -22.078 61.25 , 54.65 & 50.75



VAT , 851202
SI PROTECTION PROD VEHICLE
85336@000000
HEDZ61

PLOT DATE 10-DEC-85 09:11:45
FILTER = ALPF 1650/ 5217/-40
MIN. MAX VALUES = -62.01@ 62.75 , 36.26 @ 47.88



VRT
SI PROTECTION PROD VEHICLE
85336000000
HEORG1

PLOT DATE 10-DEC-85 09:11:45

FILTER = ALPF 1650/ 5217/-40
MIN, MAX VALUES = 0.128 -12.50 , 63.97 & 62.13

190.00 185.00 180.00 175.00 170.00 165.00 160.00 155.00 150.00 145.00 140.00 135.00 130.00 125.00 120.00 115.00 110.00 105.00 100.00 95.00 90.00 85.00 80.00 75.00 70.00 65.00 60.00 55.00 50.00 45.00 40.00 35.00 30.00 25.00 20.00 15.00 10.00 5.00 0.00

ACCELERATION (G)

B-5

-20.00 -10.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

TIME (mSEC)

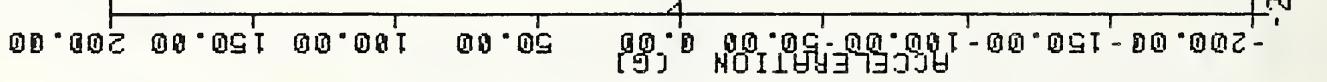
Moving deformable barrier into Chevrolet Spectrum
Driver head resultant

YRT , 851202
SI PROTECTION PROD VEHICLE
85336000000
T01XG1

PLOT DATE 10-DEC-85 09:33:16

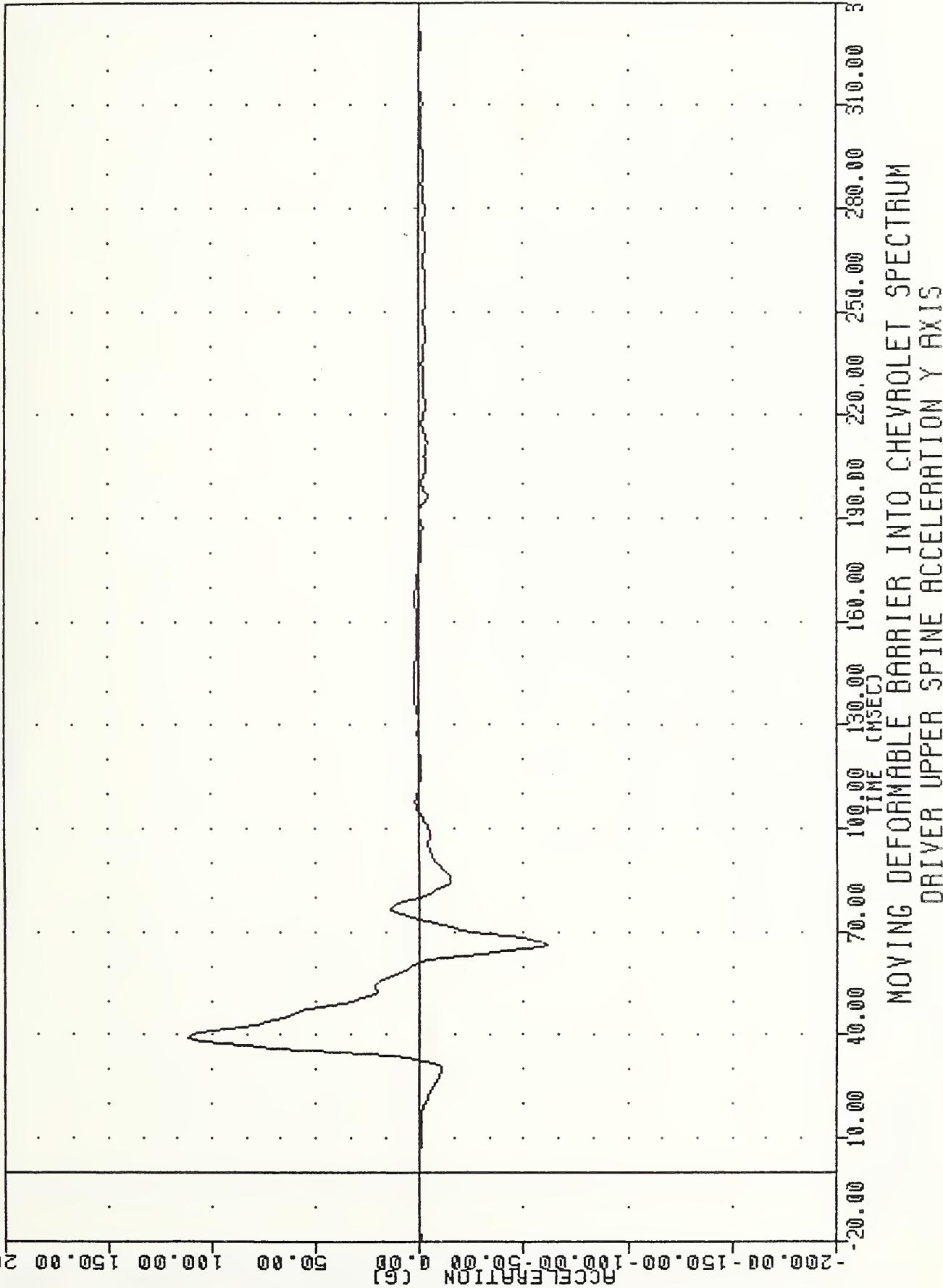
FILTER = HSRI
MIN. MAX VALUES = -25.448 38.75 , 131.13 & 85.00

SEE TEST ANOMALIES.



TIME (sec)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER UPPER SPINE ACCELERATION X AXIS

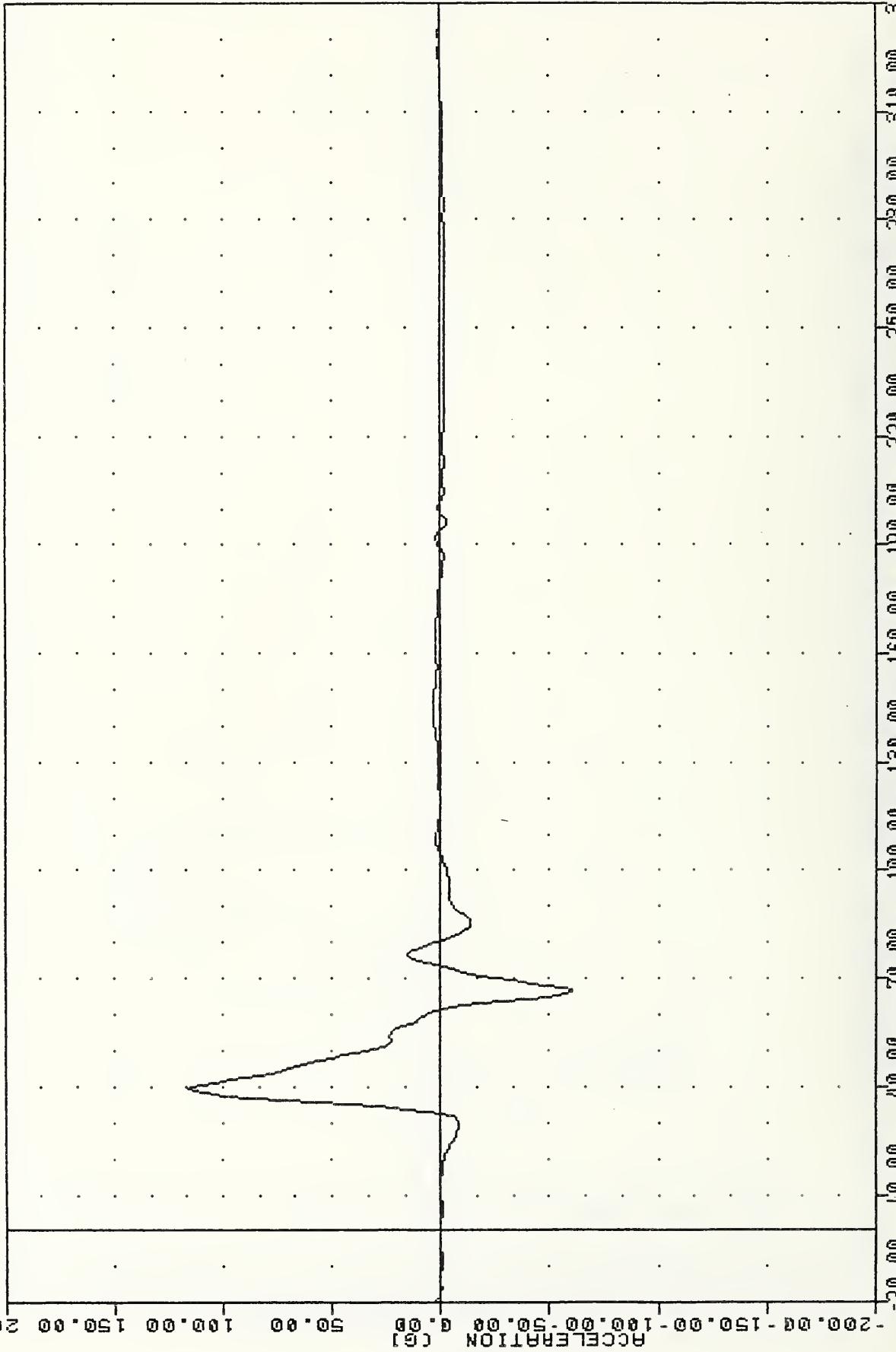
VAT , 851202 PLOT DATE 10-DEC-85 09:33:16
SI PROTECTION PROD VEHICLE
8533600000 FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -60.92@ 66.25 , 111.47 @ 39.38
T01Y61



WAT
SI PROJECTION PROD VEHICLE
85336000000
T01YEA

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN. MAX VALUES = -60.46@ 66.25 , 115.40 @ 39.38

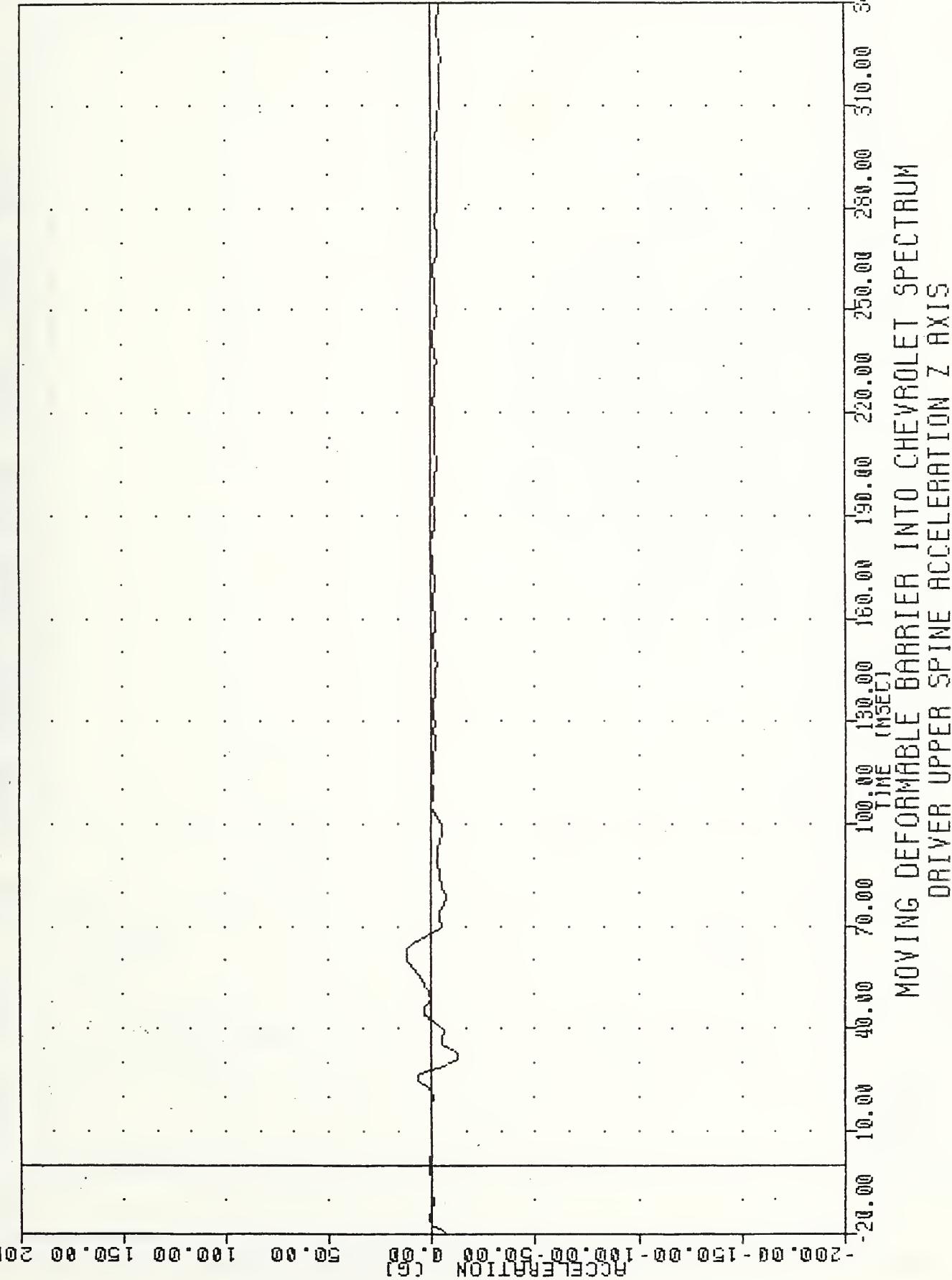


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER UPPER SPINE ACCELERATION #2 Y AXIS

VRT
SI PROTECTION PROD VEHICLE
85336000000
101761

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -12.90 & 31.88 , 12.42 & 61.87

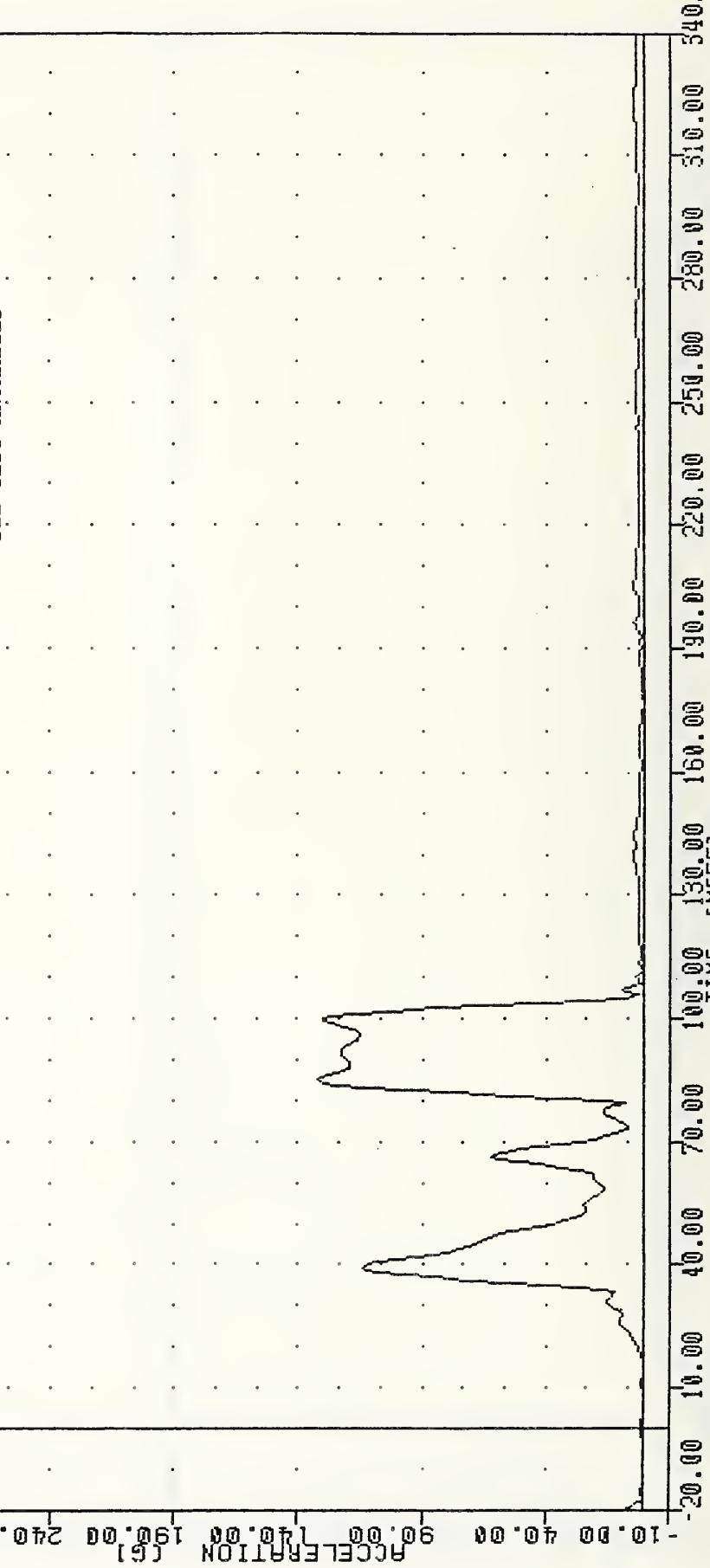


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER UPPER SPINE ACCELERATION Z AXIS

YRT , 851202
SI PROTECTION PROD VEHICLE
8533600000
T01RG1

PLOT DATE 10-DEC-85 09:33:16
FILTER = HSR1 136/ 189/ -50
MIN. MAX. VALUES = 0.23@ 3.75 , 132.03 @ 85.00

SEE TEST ANOMALIES



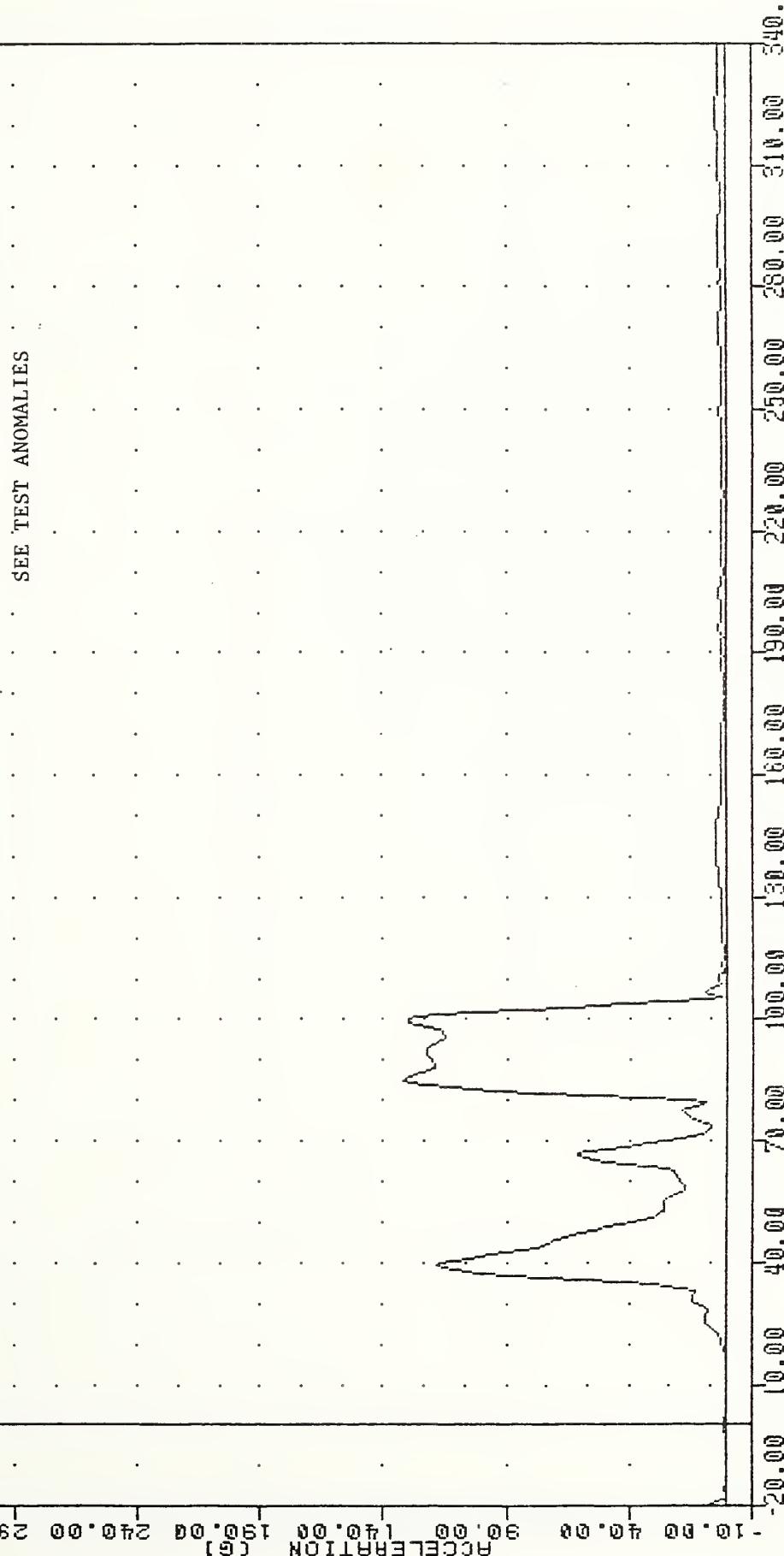
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER UPPER SPINE RESULTANT

VAT , 851202
SI PROTECTION PROD VEHICLE
85336000000
TOIREA

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = 0.04@ 10.63 , 131.92 @ 85.00

SEE TEST ANOMALIES

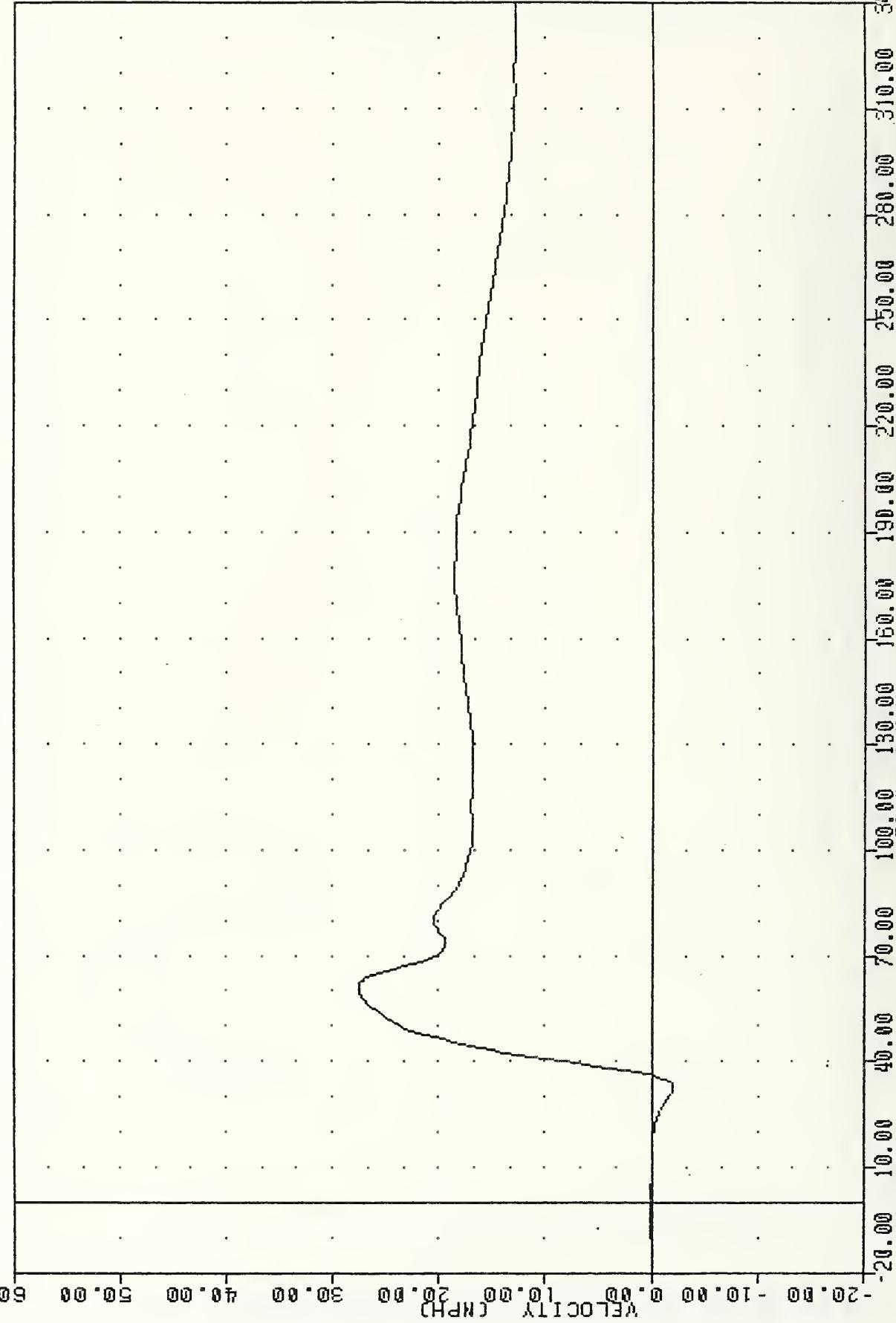


Moving deformable barrier into Chevrolet Spectrum
Driver upper spine resultant using T01Y6A

VRT
SI PROTECTION PROD VEHICLE
85336@000001
T01YV1

PLOT DATE 10-DEC-85 09:35:14

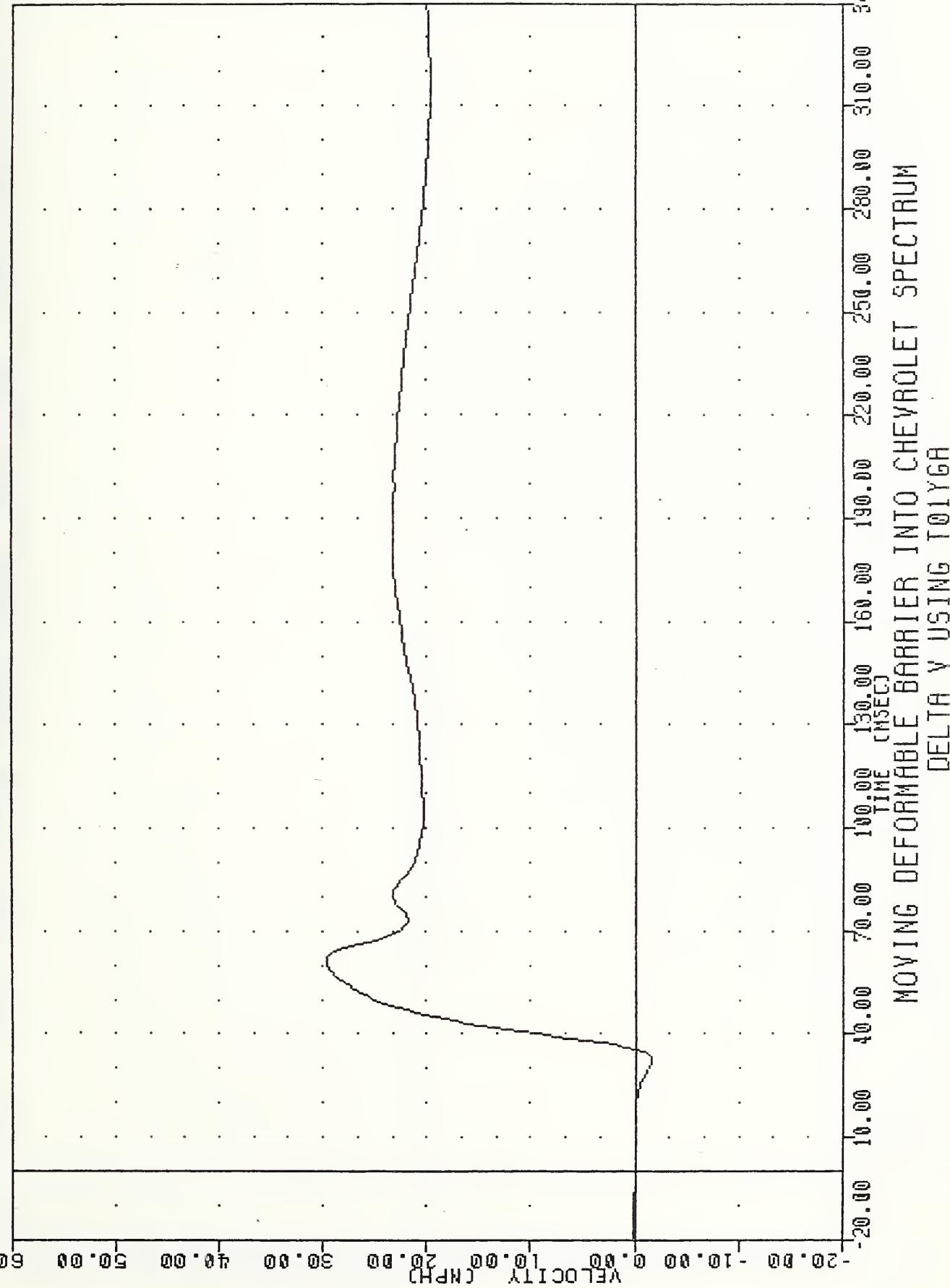
FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -2.10@ 32.50 . 27.51 @ 61.25



Moving deformable barrier into Chevrolet Spectrum
Delta V using T01YG1

VRT
SI PROTECTION PROD VEHICLE
853360000000
T01YVA

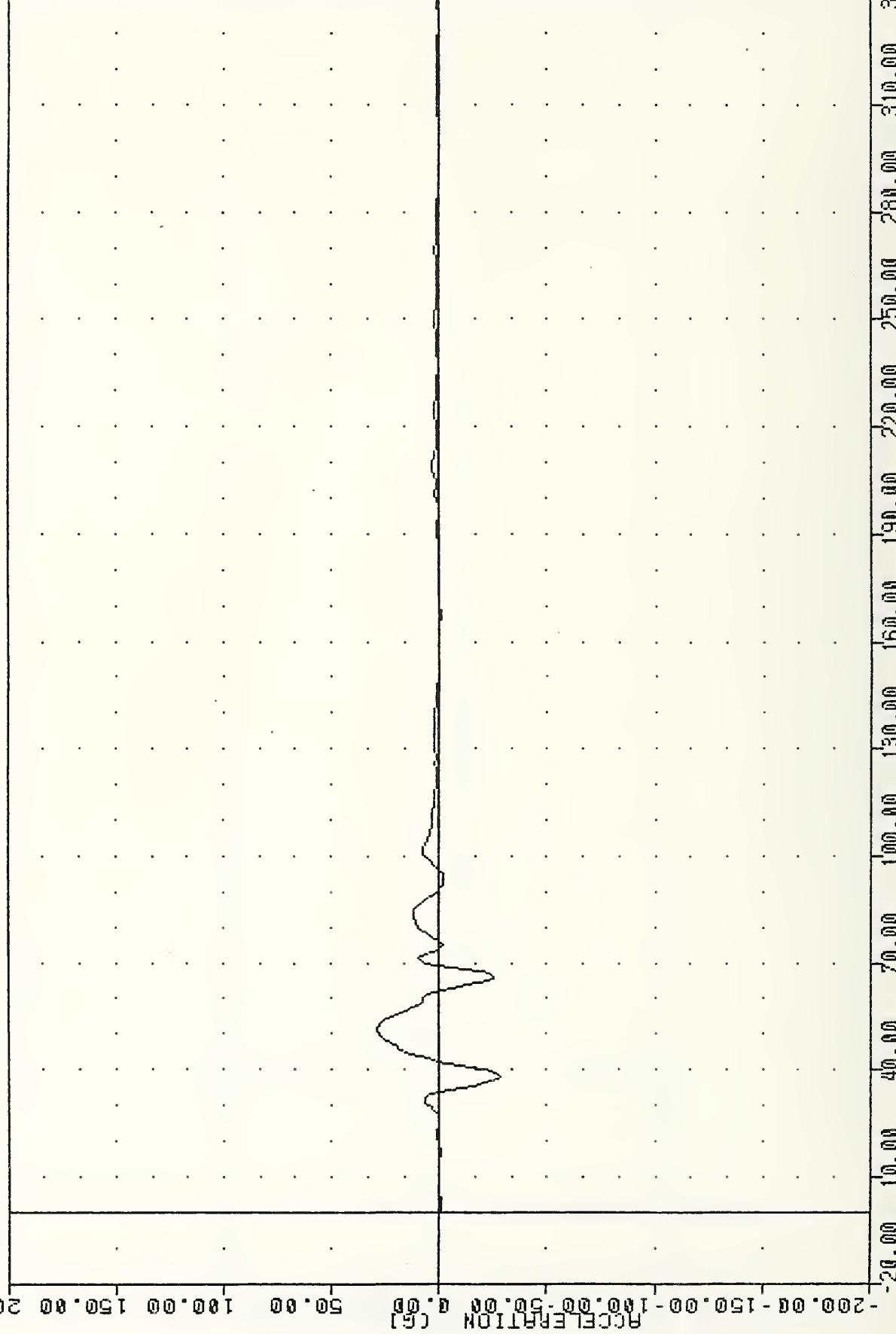
PL01 DATE 10-DEC-85 09:35:14
FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -1.68@ 32.50 , 29.67 @ 61.87



VRT , 851202
SI PROTECTION PROD VEHICLE
8533600000
112X61

PLOT DATE 10-DEC-65 09:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -28.478 38.13 , 28.69 8 51.25

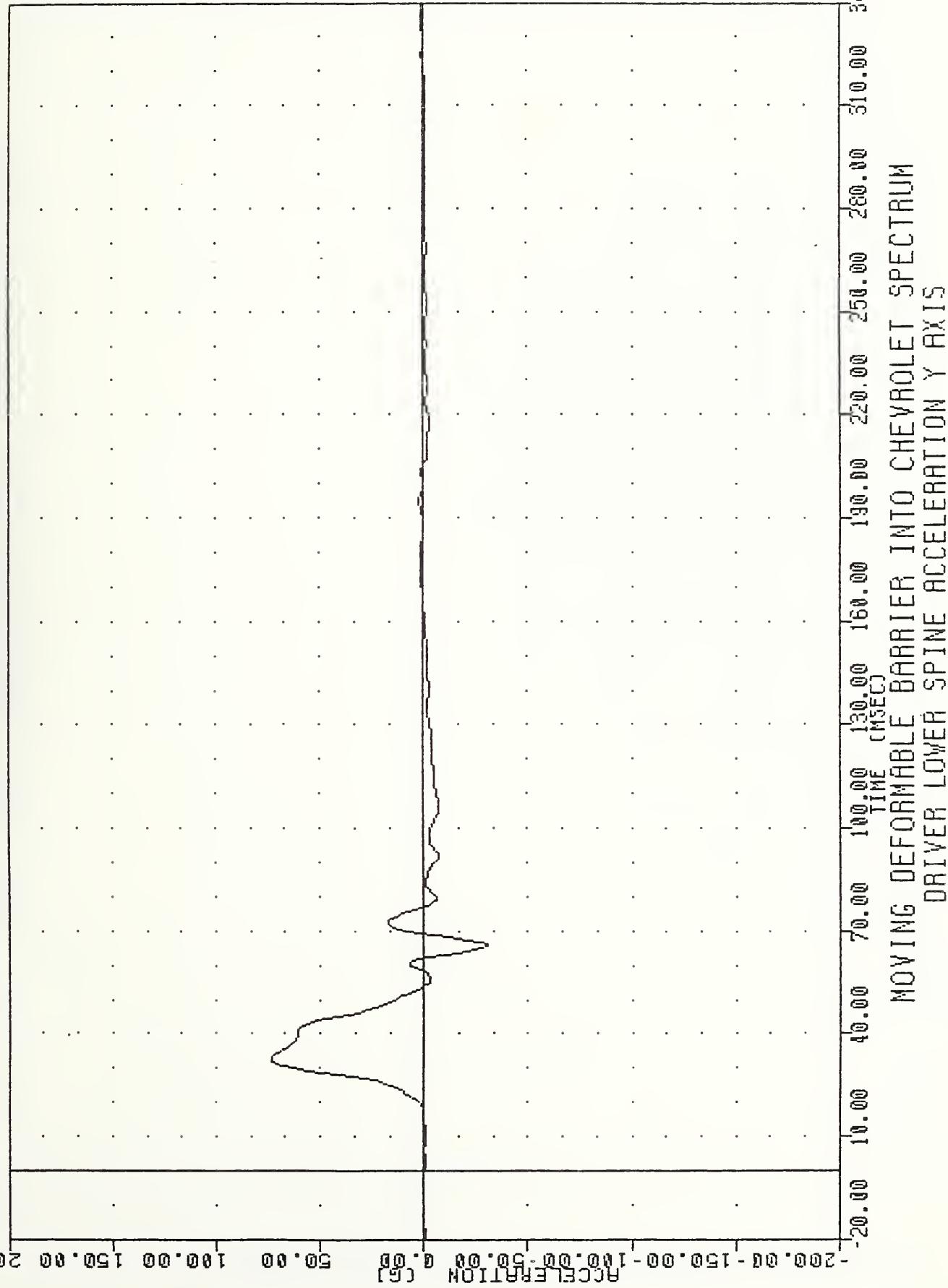


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER LOWER SPINE ACCELERATION X AXIS

VRT
SI PROTECTION PROD VEHICLE
853360000000
T12Y61

PLOT DATE 10-DEC-85 09:33:16

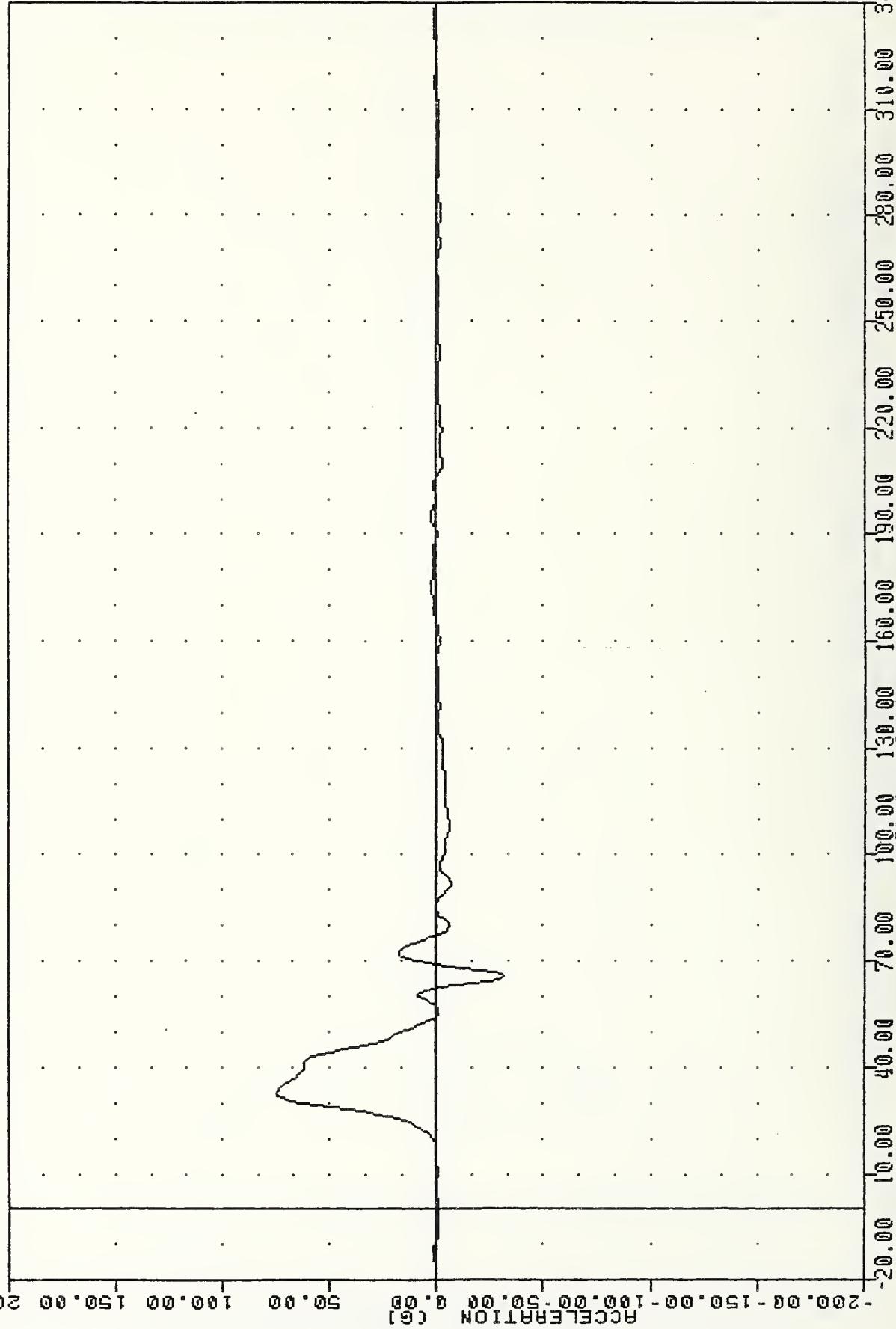
FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -30.79 & 65.63 , 73.84 & 32.50



VAT , 851202
SI PROTECTION PROD VEHICLE
85336000000
T12Y6A

PLT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -31.87@ 65.63 , 74.93 @ 32.50

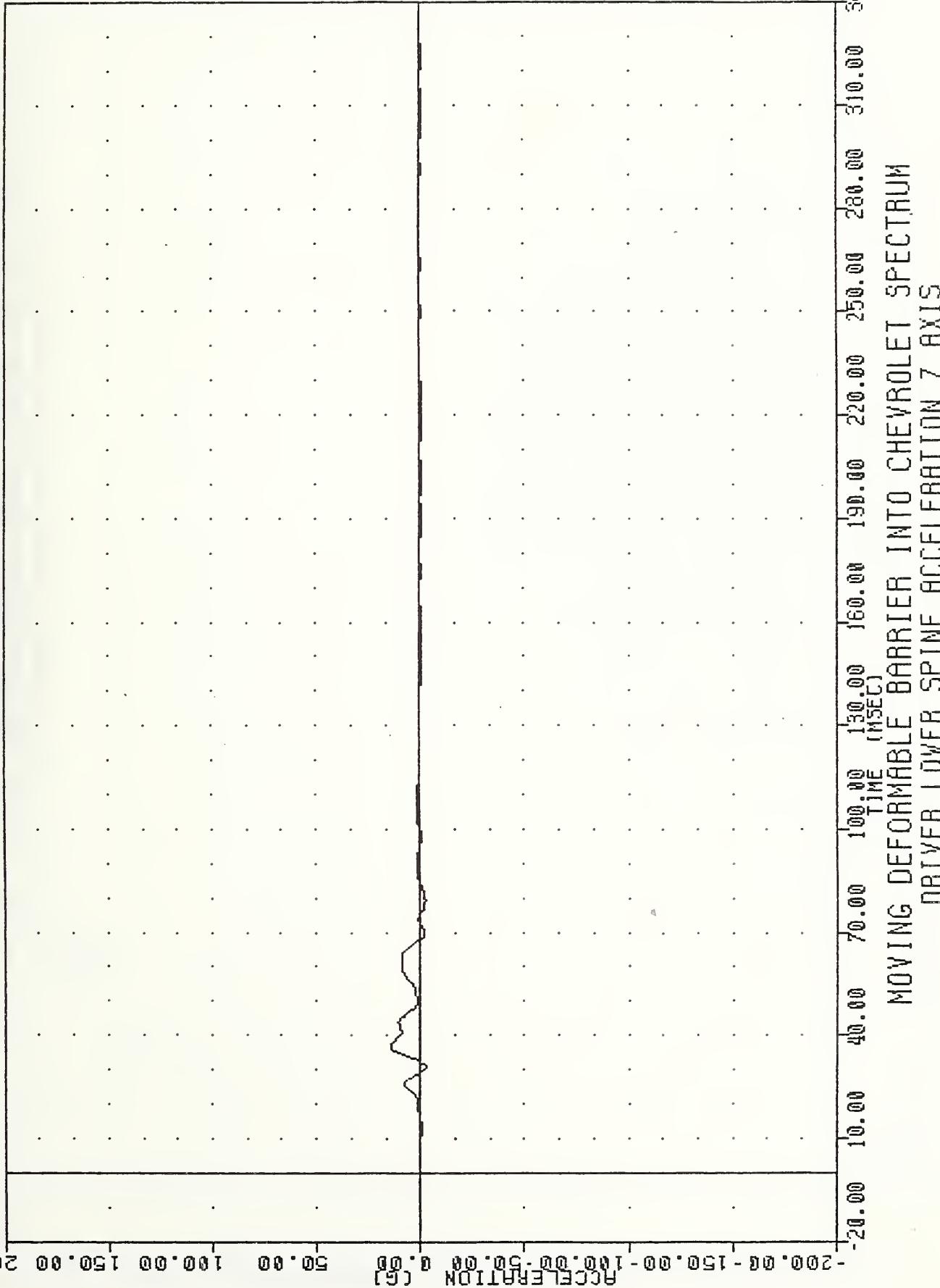


Moving deformable barrier into chevrolet spectrum
Driver lower spine acceleration -2 Y axis

VRT
SI PROTECTION PAD VEHICLE
8533600000
T12ZG1

PLOT DATE 10-DEC-85 09:33:16

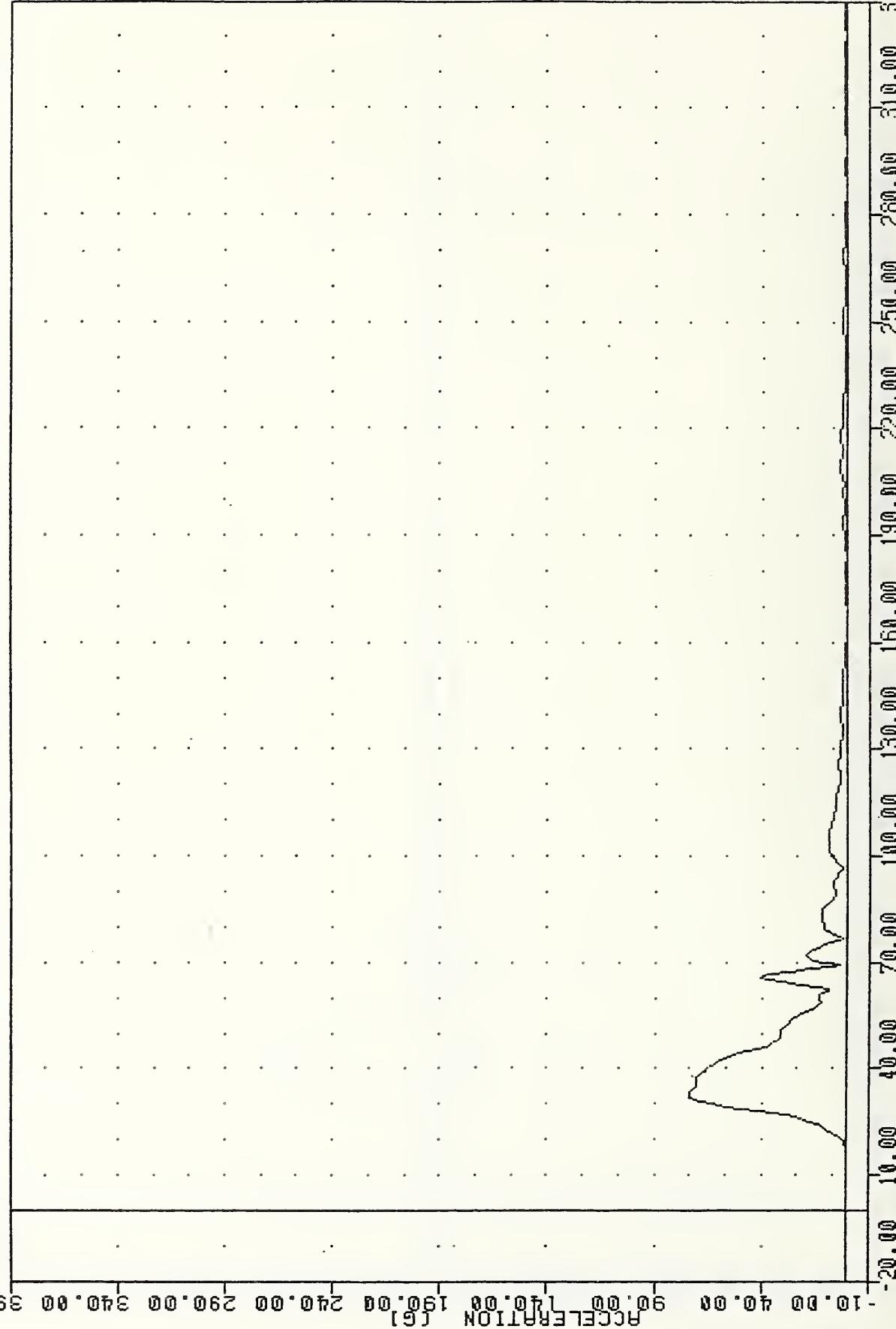
FILTER = HSRI 136/ 189/ -50
MIN. MAX VALUES = -2.928 30.62 , 14.15 & 36.88



VRI
SI PROTECTION FROM VEHICLE
853360000000
T12RG1

PLOT DATE 10-DEC-85 09:33:16

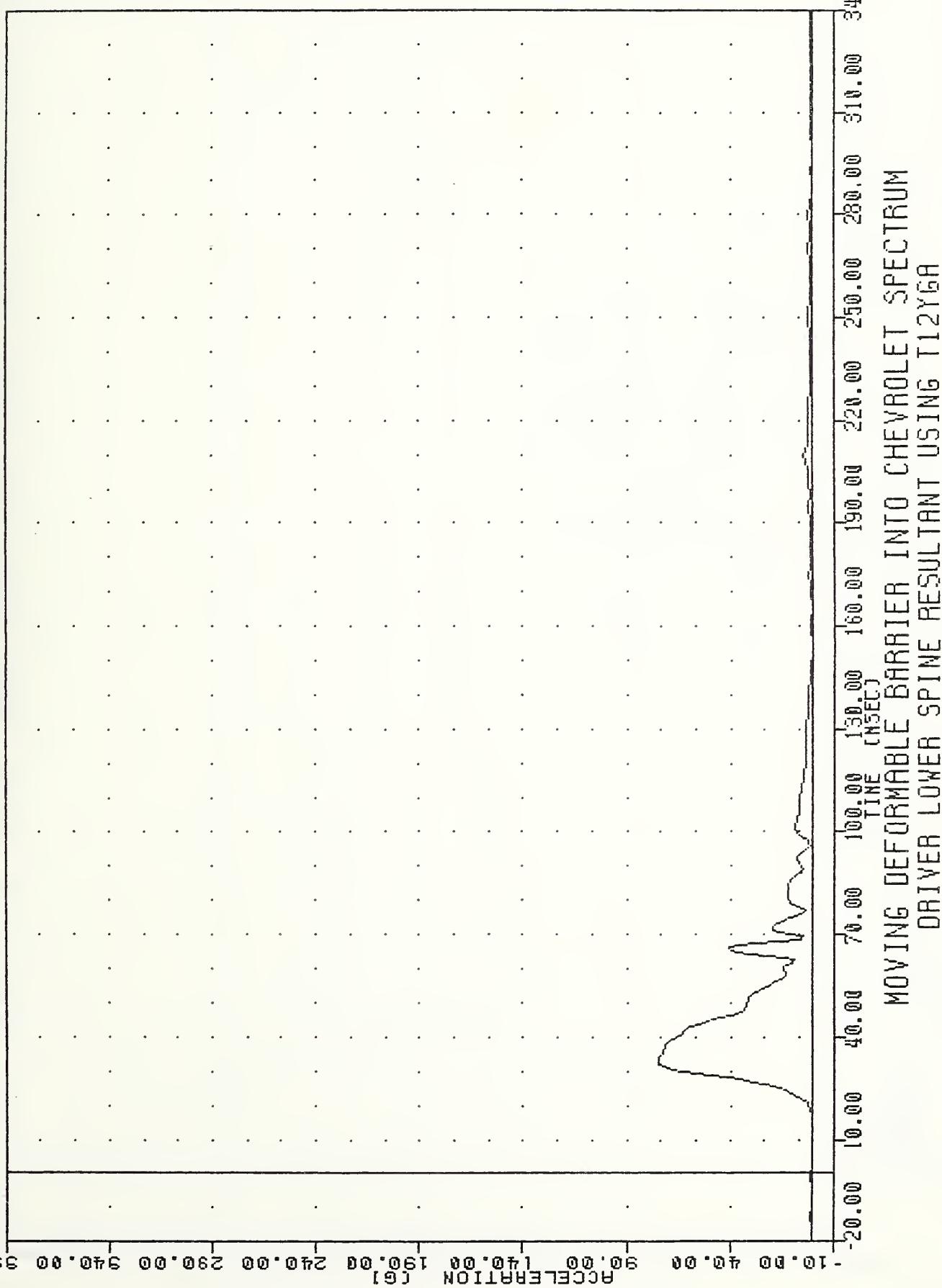
FILTER = HSRI 136/ 189/-50
MIN. MAX VALUES = 0.18@ -7.5@ , 74.06 @ 32.5@



Moving deformable barrier into Chevrolet Spectrum
Driver lower spine resultant

VAT , 851202
SI PROTECTION PROD VEHICLE
653360000000
T12RGA

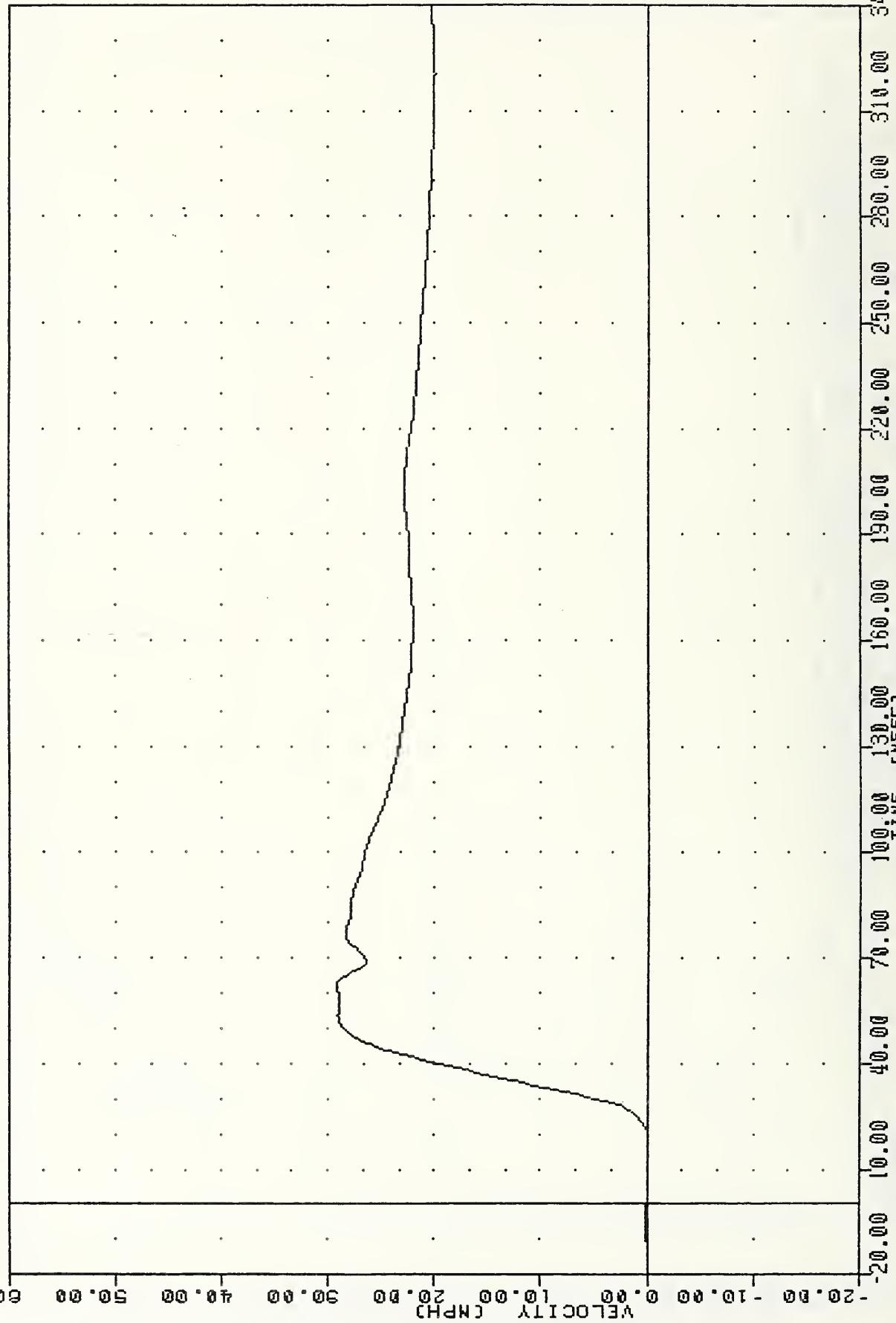
PLOT DATE 10-DEC-85 09:33:16
FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = 0.078 286.87 . 75.15 & 32.50



Moving deformable barrier into Chevrolet Spectrum
Driver lower spine resultant using T12YGA

VAT 851202
SI PROTECTION PROD VEHICLE
85336000000
T12YY1

PLT DATE 10-DEC-85 09:35:14
FILTER = HSR1 136/ 189/-50
MIN, MAX VALUES = -0.11@ 17.50 .
29.26 @ 61.87



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING T12YG1

YRT 851202
SI PROTECTION PROD VEHICLE
8533600000
T12YVA

PLOT DATE 10-DEC-85 09:35:14

FILTER = HSRI 136/
MIN. MAX VALUES = -0.048 13.13 . 30.42 & 62.50

VELOCITY (MPH)

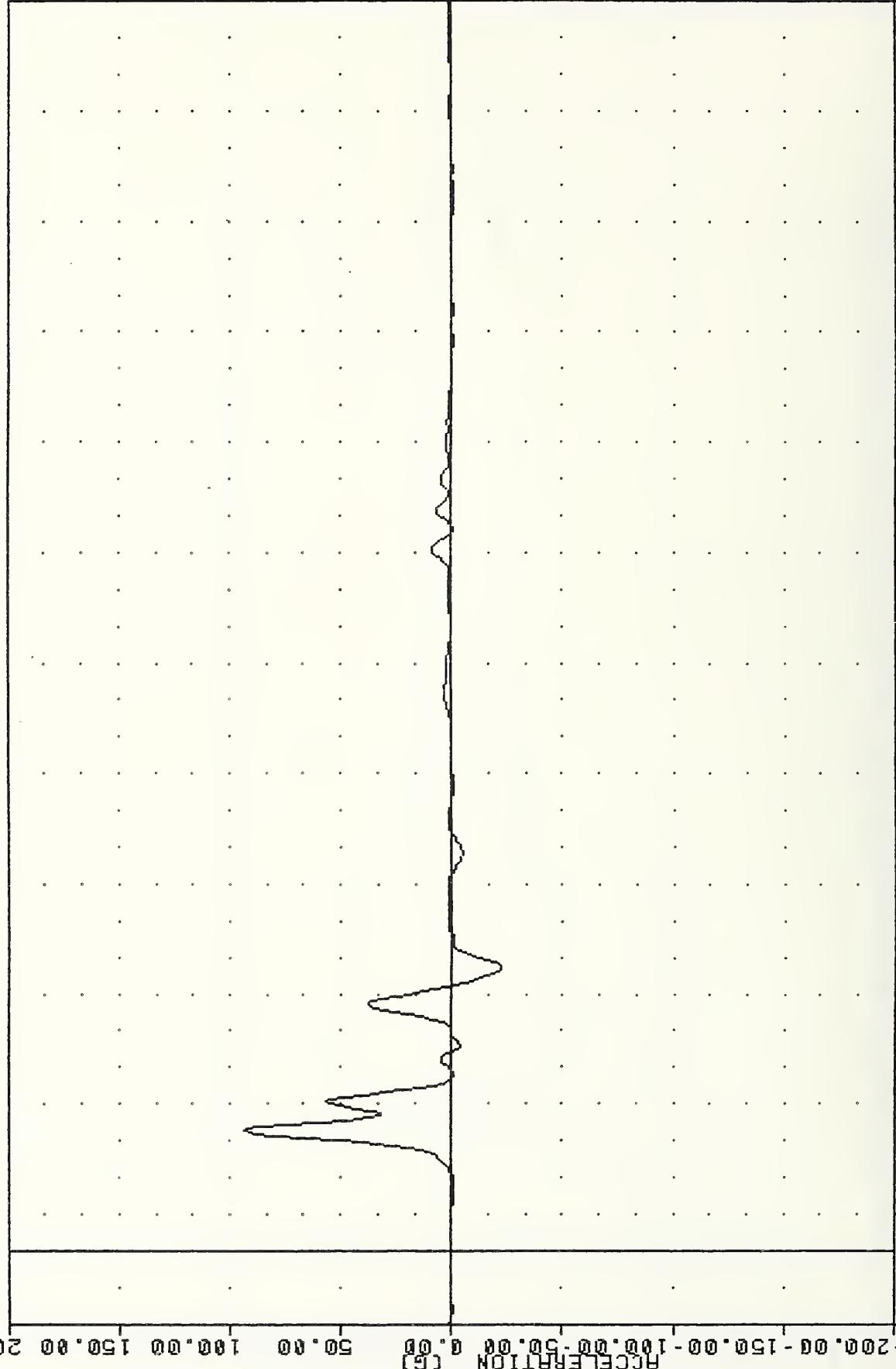
-20.00 -10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00
TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA Y USING T12YGA

YRT , 851202
SI PROTECTION PROD VEHICLE
85336000000
LURY G1

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRII 136/ 189/-50
MIN, MAX VALUES = -22.39@ 77.5@ , 94.11 @ 32.5@



-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00 250.00 300.00 350.00
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER LEFT UPPER RIB ACCELERATION Y AXIS

VAT , 851202
SI PROTECTION PROV VEHICLE
85336000000
LURYY1

PLOT DATE 10-DEC-85

09:35:14

FILTER = HSRI 136/
MIN, MAX VALUES = -0.15@ 21.25 ,

26.80 @ 340.00

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

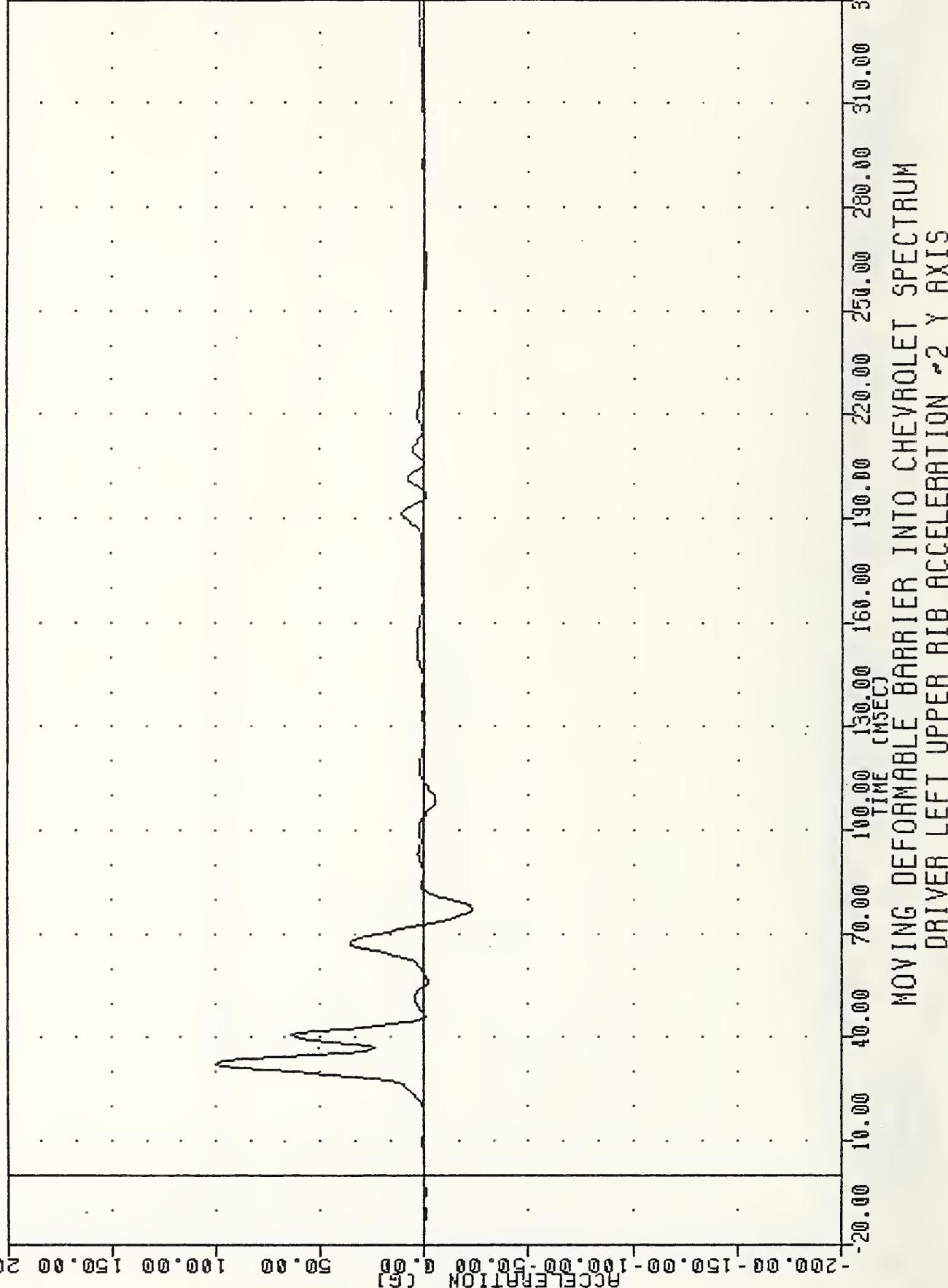
VELOCITY (NM/H)

TIME (SEC)

MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING LURYY1

YRT , 851202
SI PROTECTION PROV VEHICLE
85336000000
LURAYA

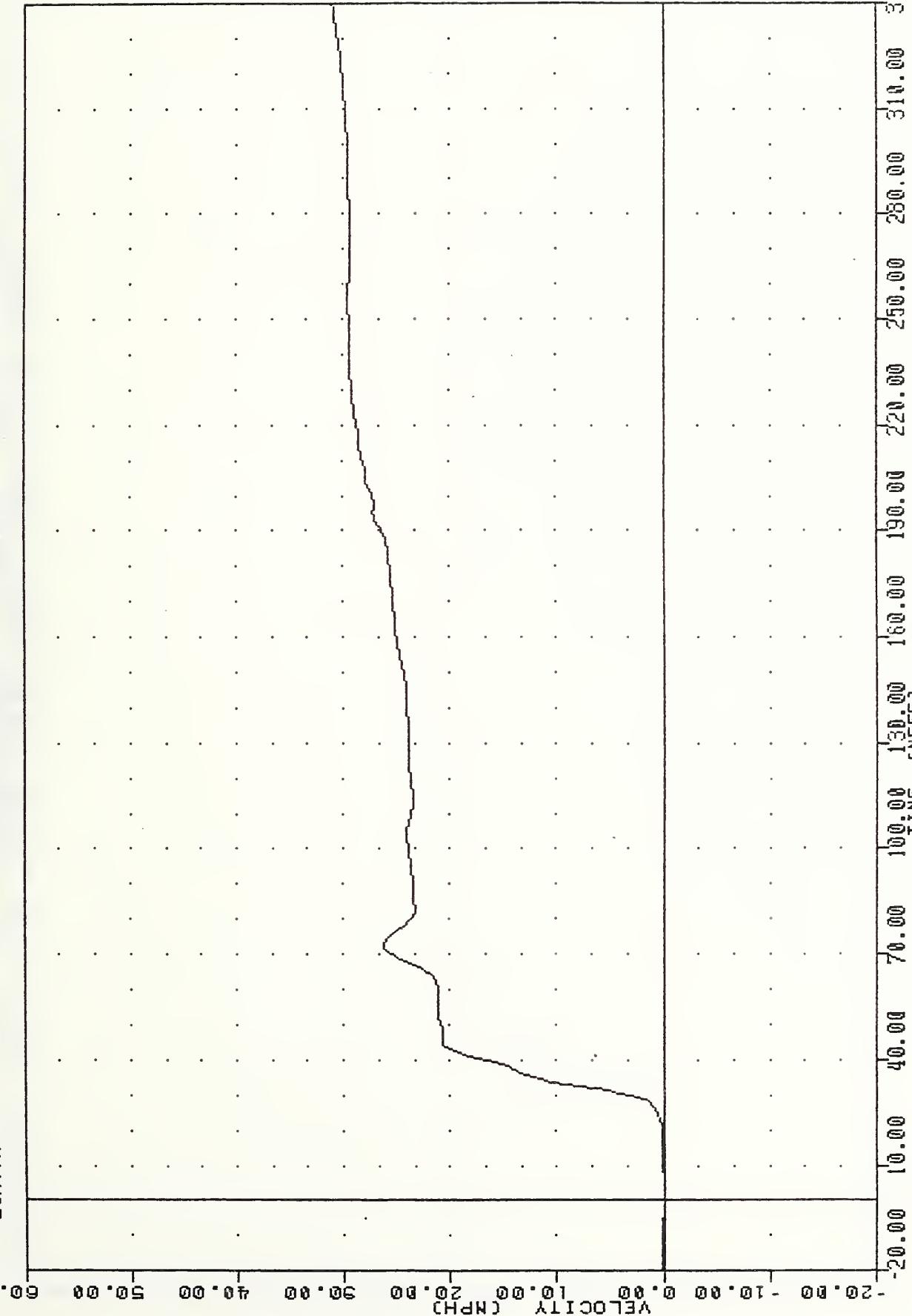
PLOT DATE 10-DEC-85 09:38:16
FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -22.97@ 77.50 , 99.82 @ 32.50



VAT
SI PROTECTION PROD VEHICLE
85336000000
LURYGA

PLOT DATE 10-DEC-85 09:35:14

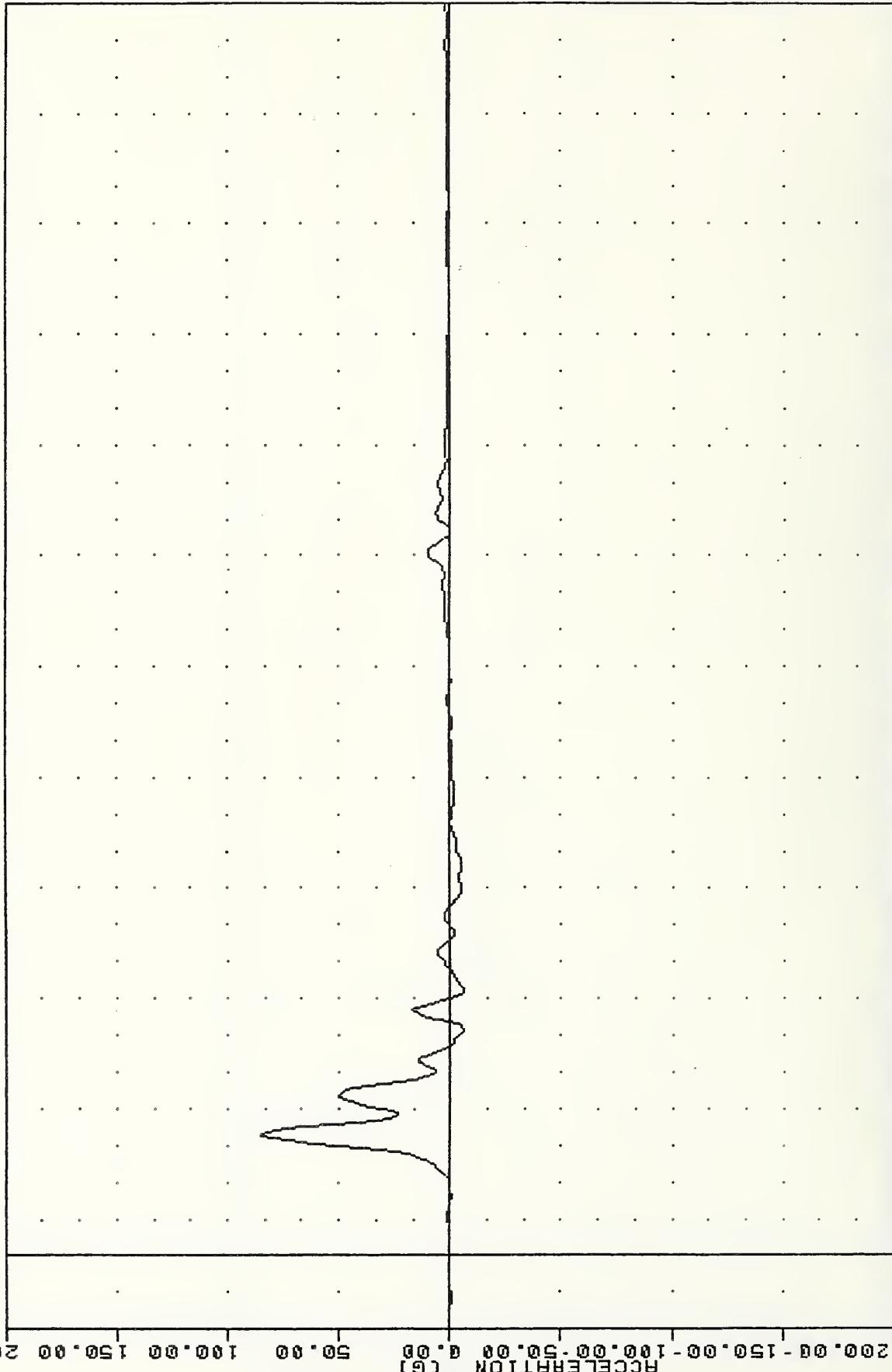
FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -0.018 3.13 . 31.02 8 . 340.00



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING LURYGA

VAT , 851202
SI PROTECTION PROD VEHICLE
8533600000
LLRY61

PLOT DATE 10-DEC-85 09:33:16
FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -6.36 e 61.87 , 85.59 e 33.13



-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00
ACCELERATION (G's)
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (msec)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER LEFT LOWER RIB ACCELERATION Y AXIS

VRT
SI PROTECTION PROD VEHICLE
8533600000
LLRYV1

PLOT DATE 10-DEC-85 09:35:14

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -0.038 -8.75 , 30.03 & 340.00

-20.00 -10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00

VELOCITY (NPH)

-20.00 -10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00
TIME (NSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING LLRYV1

VRT
SI PROTECTION , 851202
PROD VEHICLE
8533600000
LLRYGA

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -6.218 61.25 , 94.25 8 32.50

0.00

150.00

100.00

50.00

0.00

ACCELERATION (G)

-200.00 -150.00 -100.00 -50.00 50.00 100.00 150.00 200.00 250.00 280.00 310.00 340.00
TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER LEFT LOWER RIB ACCELERATION #2 Y AXIS

VRT
SI PROTECTION PROD VEHICLE
85336000000
LLAYA

PLOT DATE 10-DEC-85 09:35:14

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -0.12@ -8.75 , 33.35 @ 340.00

0.00

50.00

100.00

150.00

200.00

250.00

300.00

350.00

400.00

450.00

500.00

550.00

600.00

650.00

700.00

750.00

800.00

850.00

900.00

950.00

1000.00

1050.00

1100.00

1150.00

1200.00

1250.00

1300.00

1350.00

1400.00

B-29

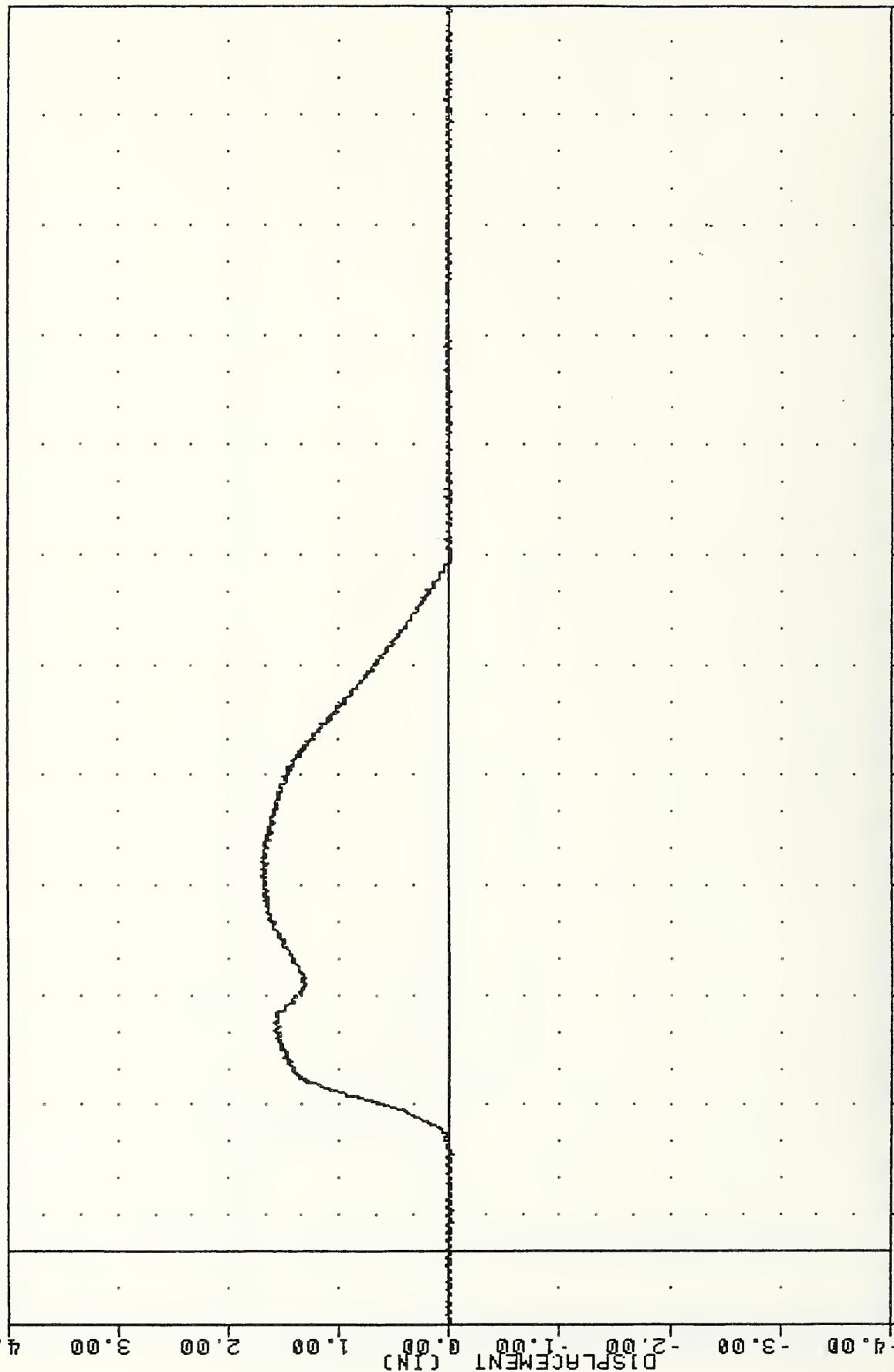
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME [MSECS]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING LLAYA

VRT
SI PROTECTION PROD VEHICLE
853360000000
LRTYD1

PLOT DATE 10-DEC-85 09:11:45

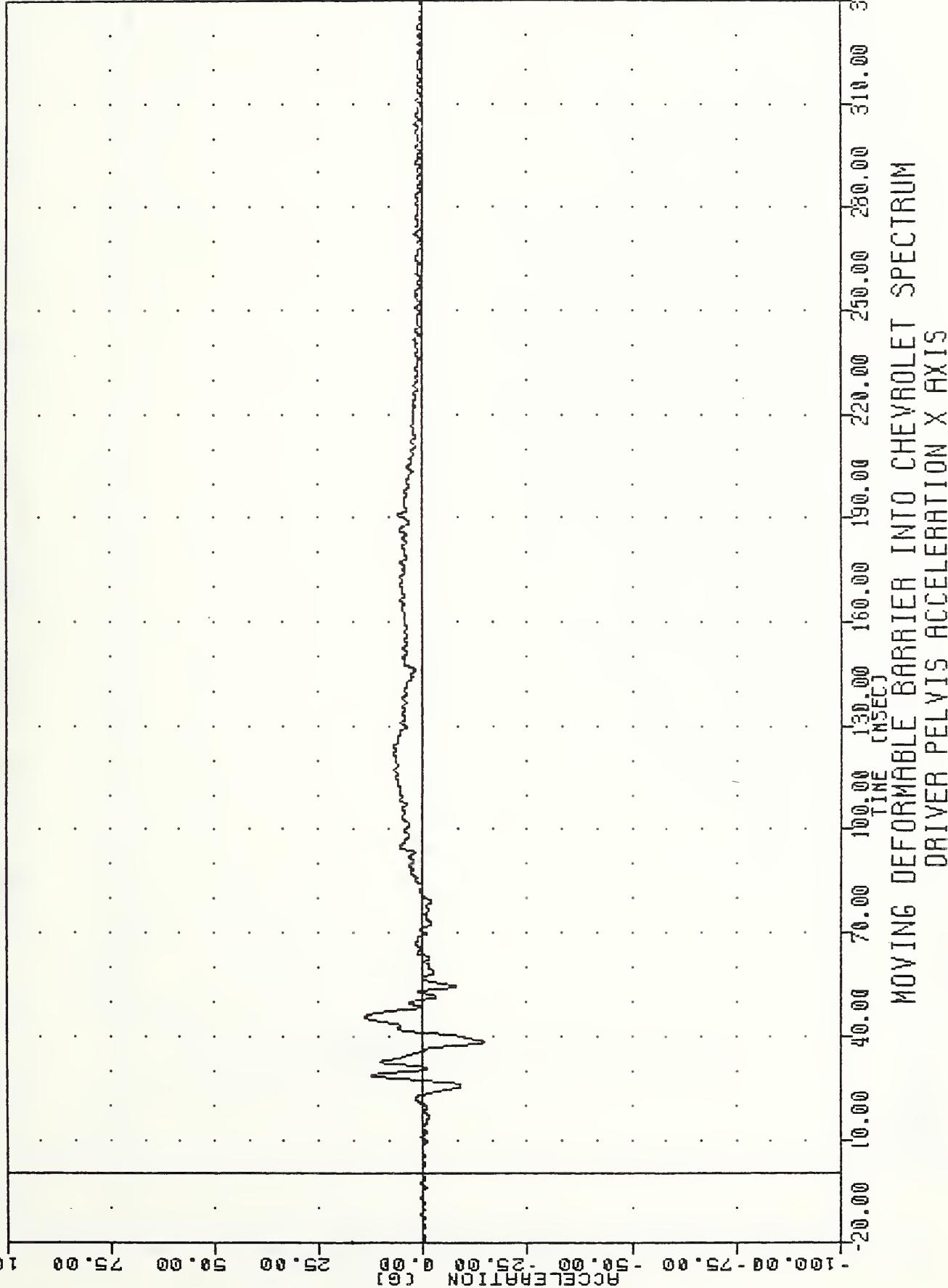
FILTER = ALPF 1650/ 5217/-40
MIN. MAX VALUES = -0.038 8.13 , 1.71 & 104.13



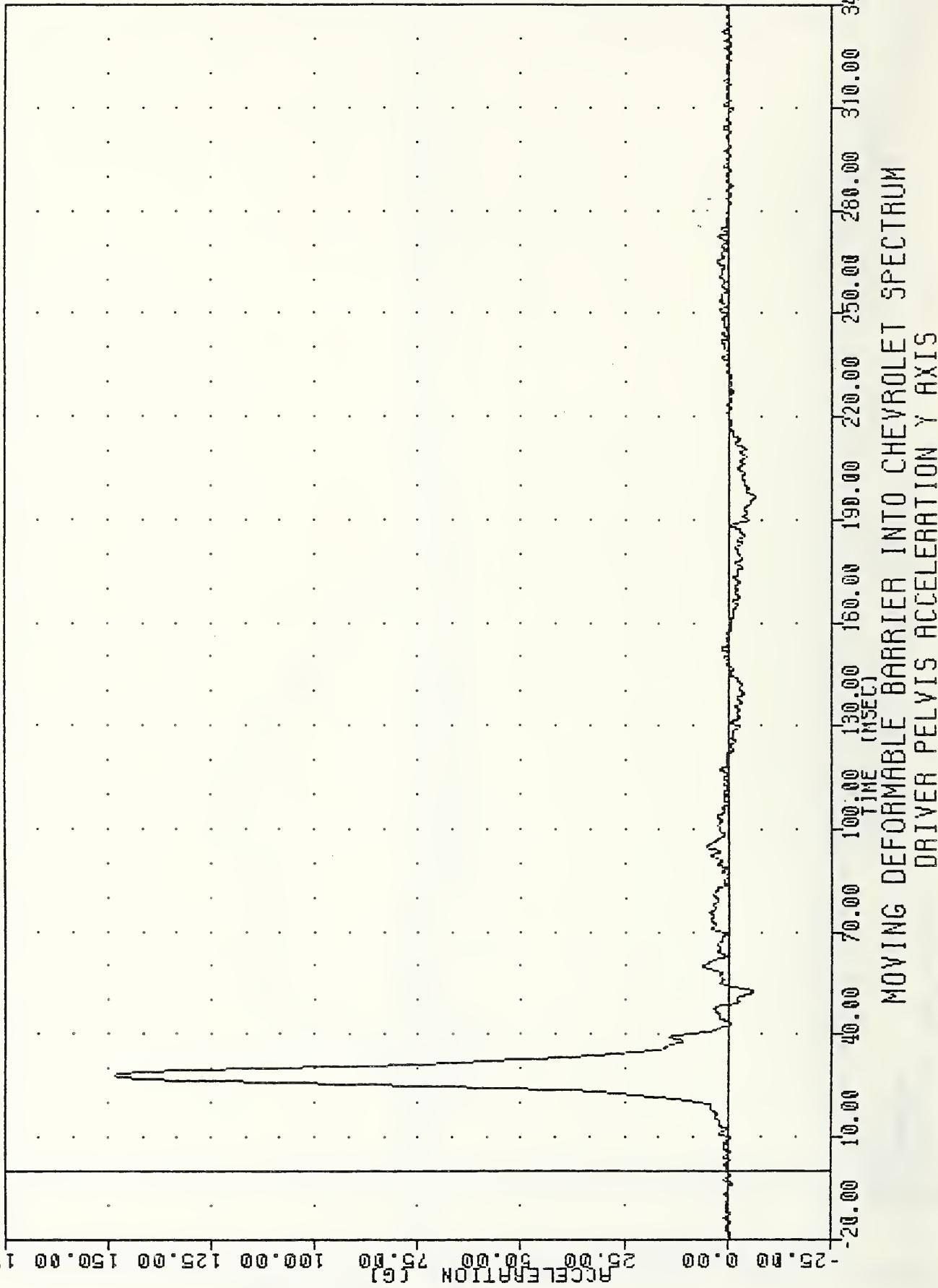
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER LEFT RIB TO SPINE DISPLACEMENT INCHES

VAT , 851202
SI PROTECTION PROD VEHICLE
853360000000
PEVX61

PLT DATE 10-DEC-85 09:11:45
FILTER = BLPP 300/ 949/-40
MIN, MAX VALUES = -14.47 e 38.25 . 13.91 e 45.63

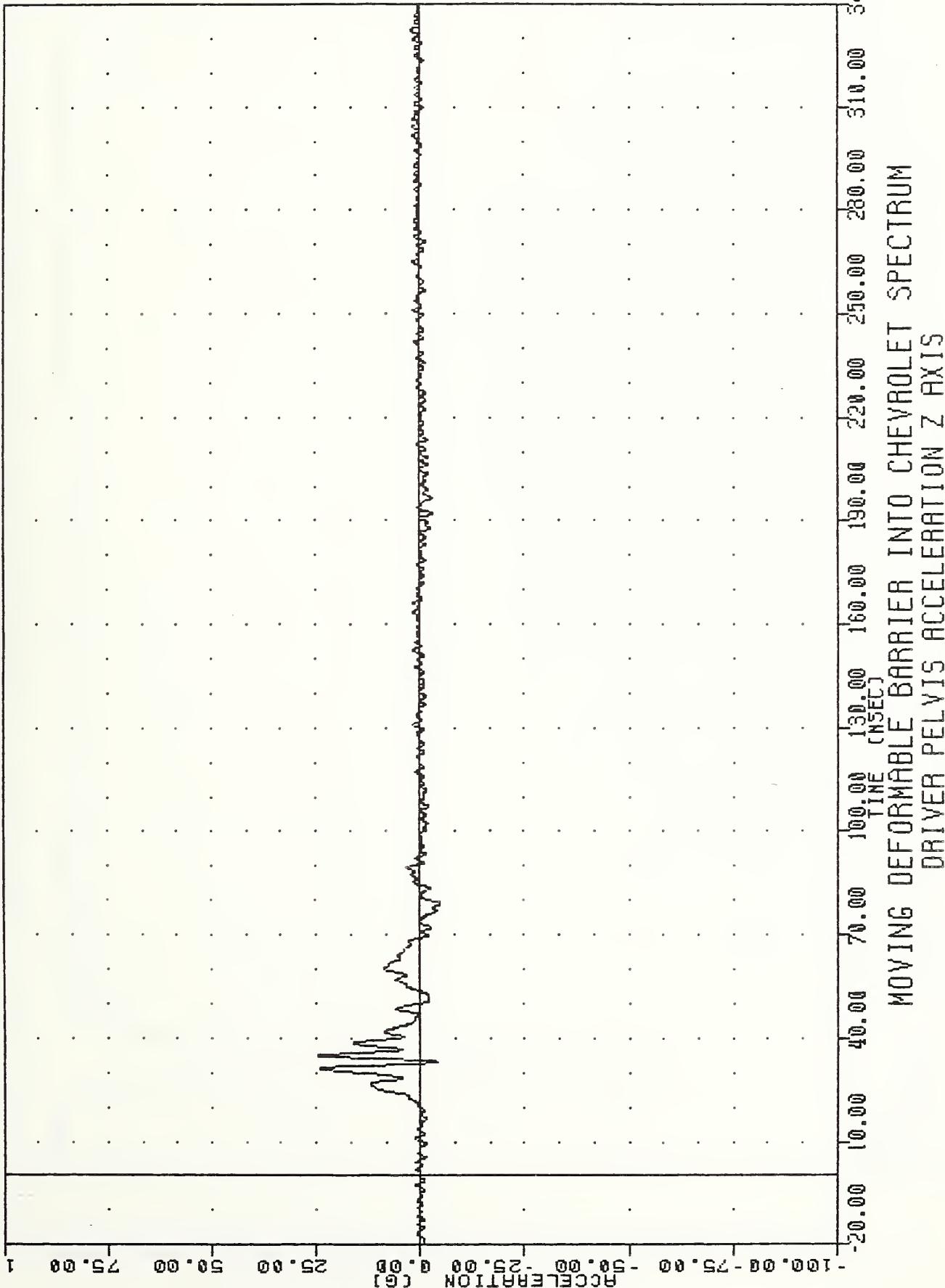


VRT 851202
SI PROTECTION PROD VEHICLE
85336000000 PEVY61
PLOT DATE 10-DEC-85 @9:11:45
FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = -6.70 8 196.75 . 148.45 8 27.86



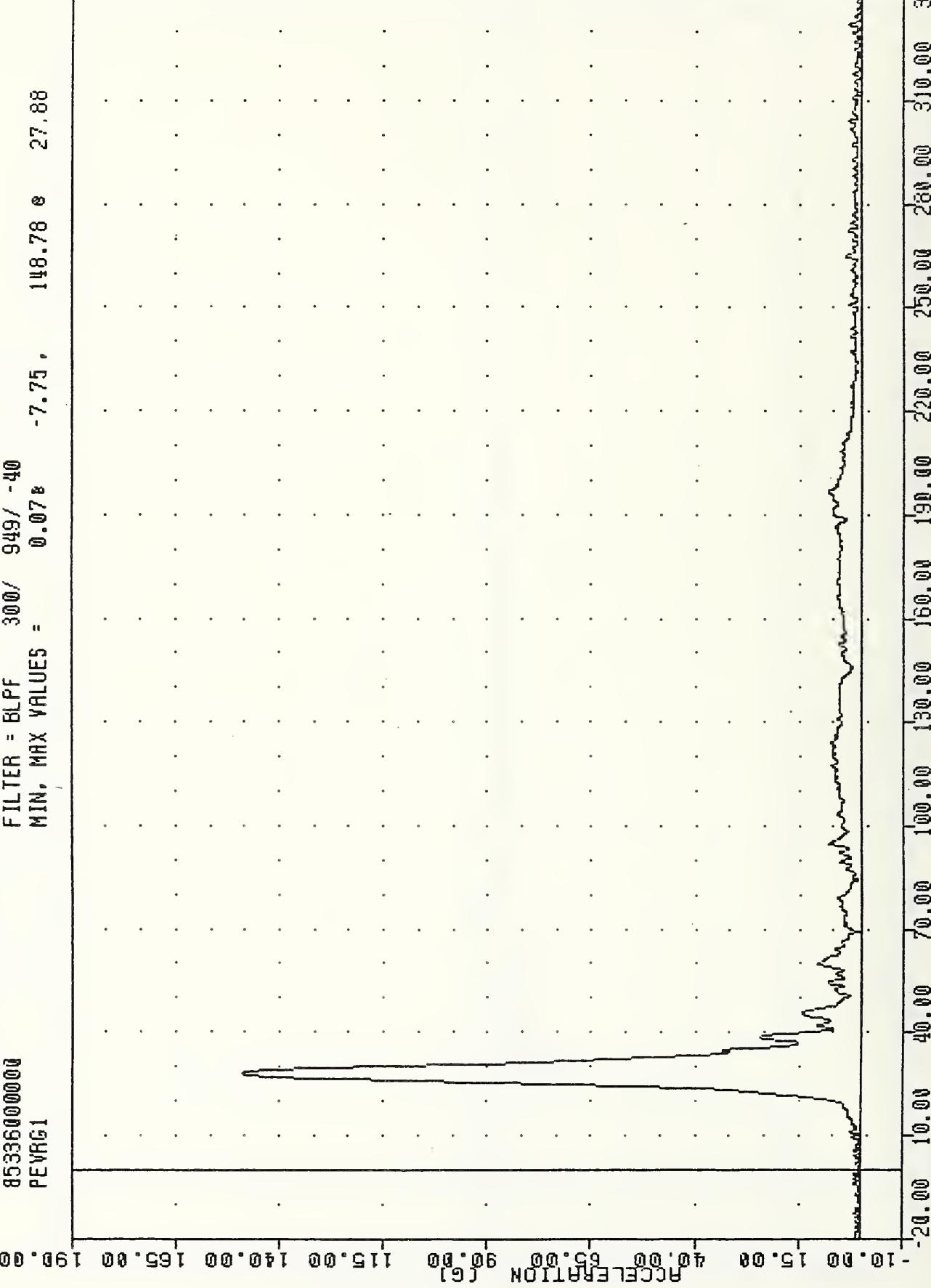
VAT
SI PROTECTION PROD VEHICLE
853360000000
PEVZ61

PLOT DATE 10-DEC-85 09:11:45
FILTER = BLPF 300/ 949/ -40
MIN, MAX VALUES = -4.64 & 79.00 . 24.48 & 34.68



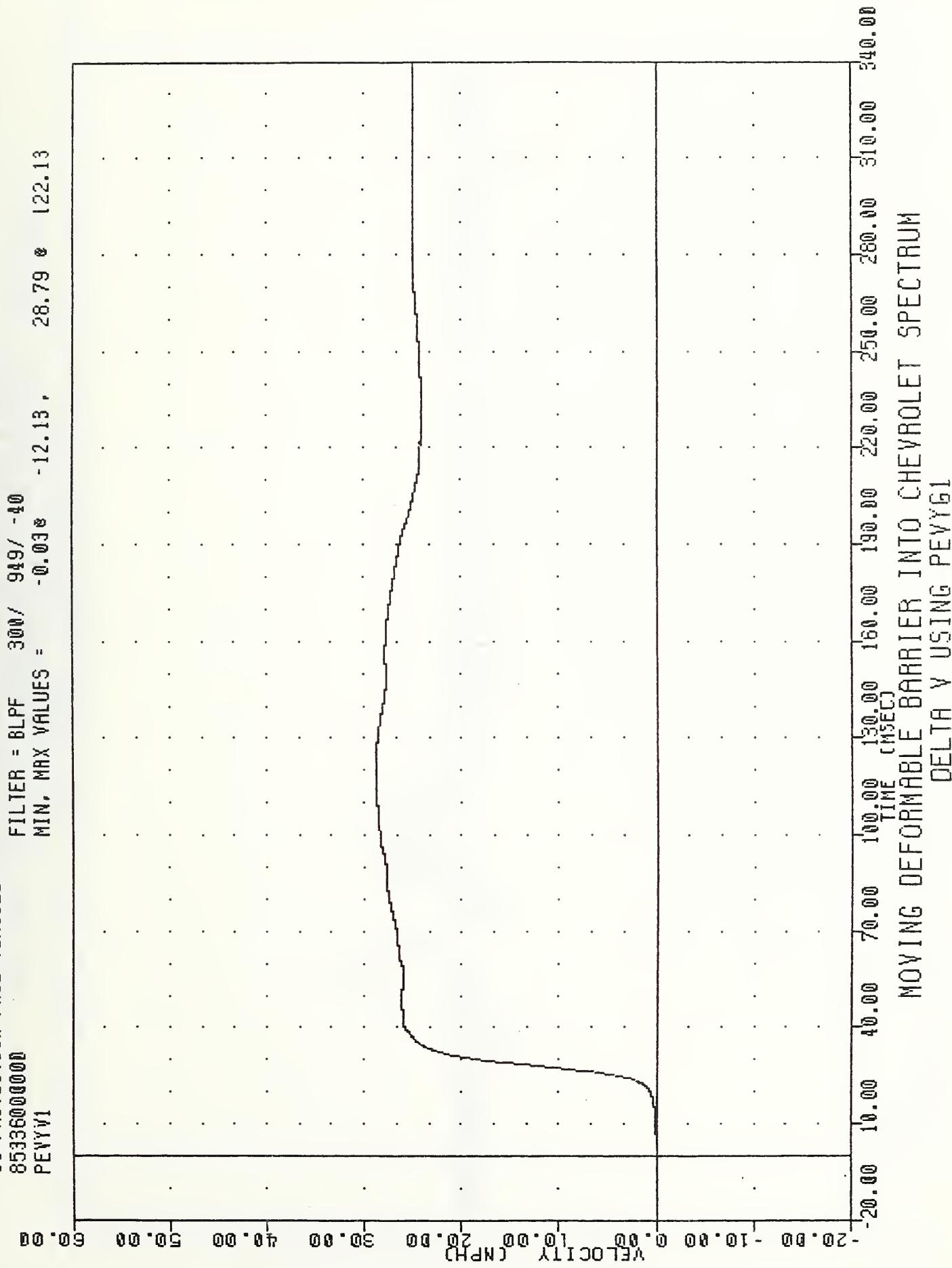
VRT
SI PROTECTION PHOD VEHICLE
85336000000
PEVRG1

PLOT DATE 10-DEC-85 09:11:45
FILTER = BLPF 3000/ 949/ -40
MIN. MAX VALUES = 0.078 -7.75 . 148.78 8 27.88



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DRIVER PELVIS RESULTANT

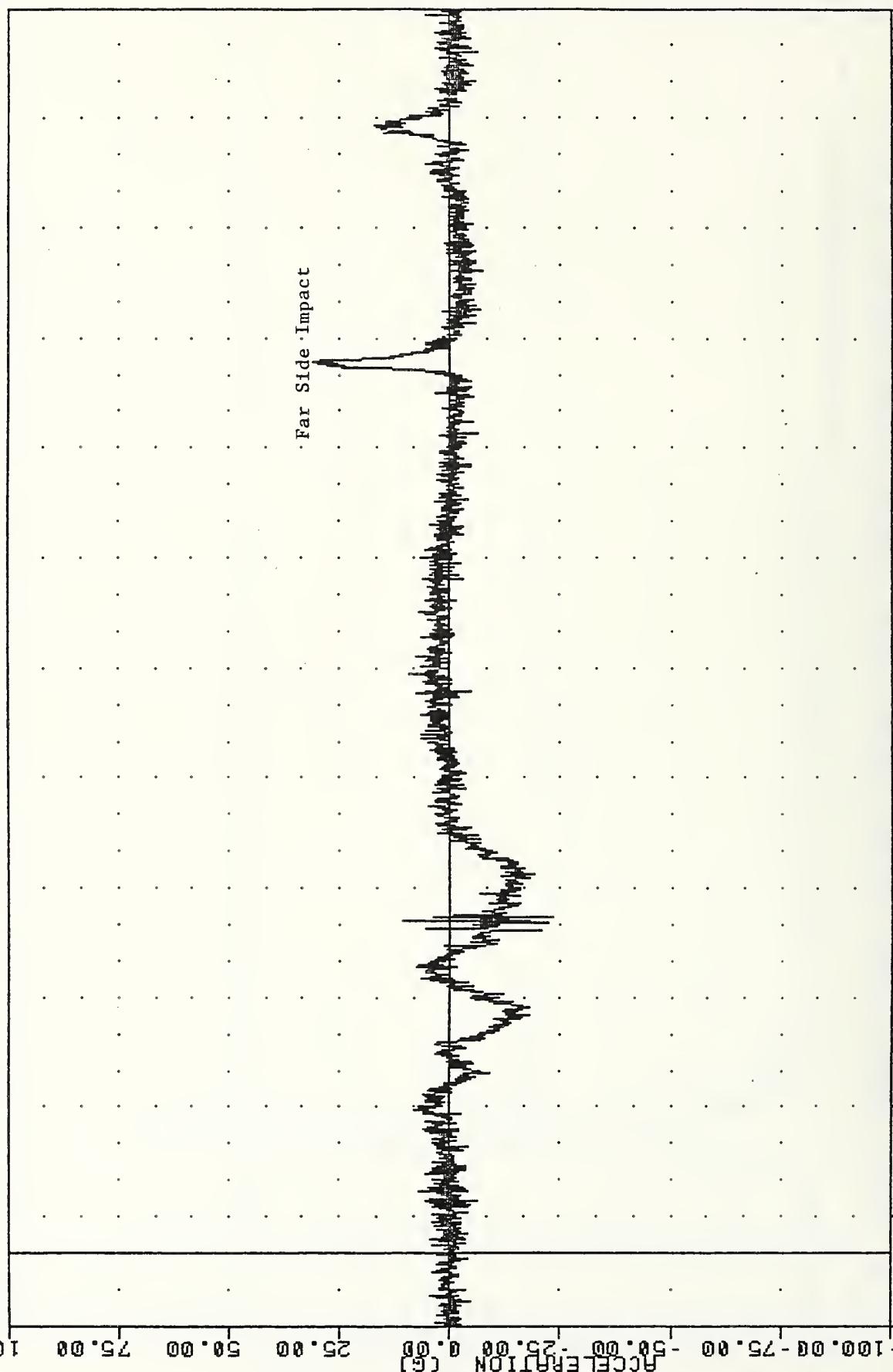
WRT
SI PROTECTION PROD VEHICLE
85336000000
PENNYI
851202
PL01 DATE 10-DEC-85 09:11:45



VRT , 851202
SI PROTECTION PROD VEHICLE
85336000000
HEDXG4

PLOT DATE 10-DEC-85 @09:11:45

FILTER = ALPF 1650/ 5217/ -40
MIN. MAX VALUES = -23.43@ 92.13 . 30.74 @ 243.38



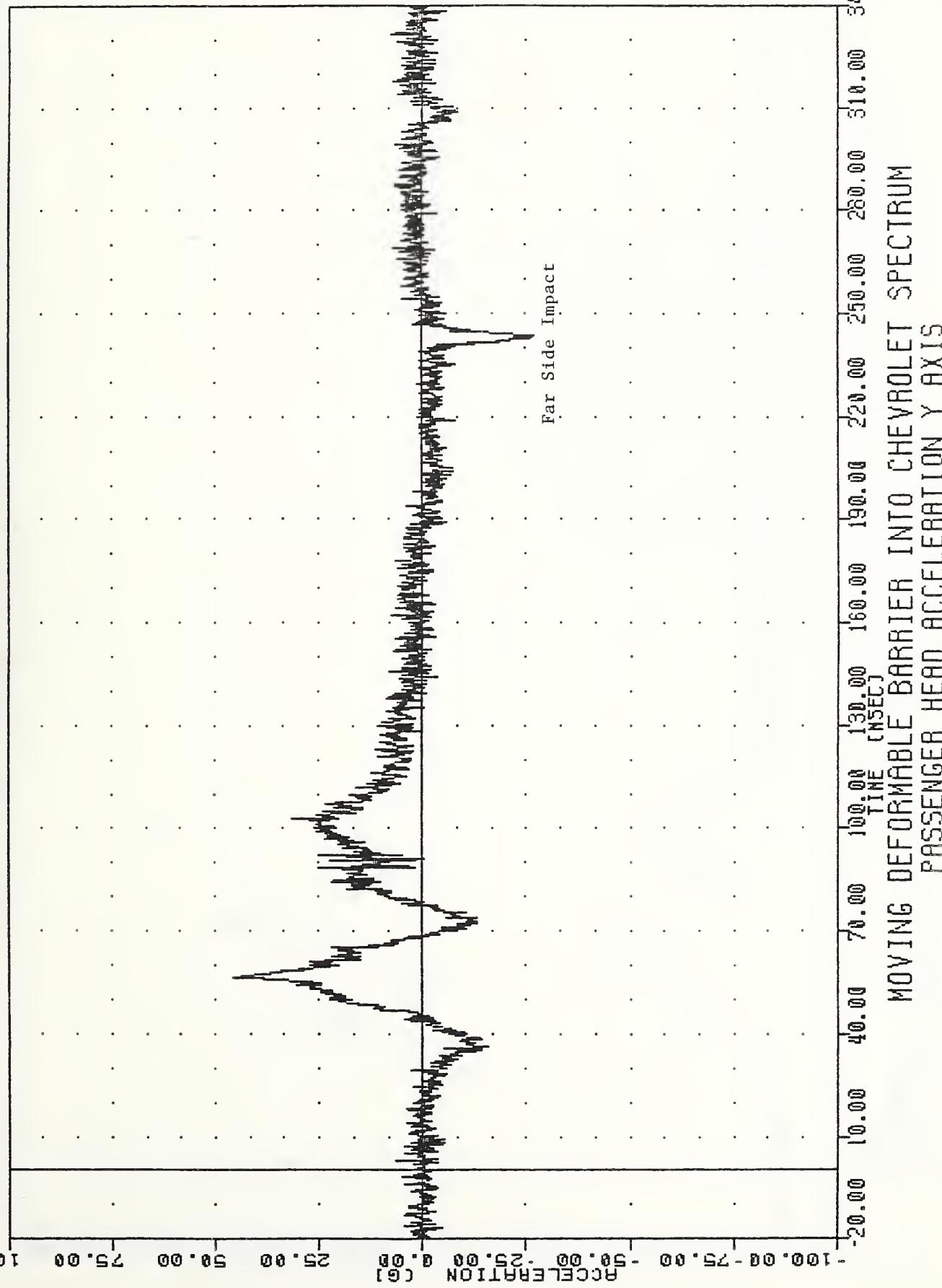
-200.00 100.00 400.00 700.00 1000.00 1300.00 1600.00 1900.00 2200.00 2500.00 2800.00 3100.00 3400.00
TIME [MSEC]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER HEAD ACCELERATION X AXIS

VAT
SI PROTECTION PROD VEHICLE
85336000000
HEDY64

PLOT DATE 10-DEC-85 09:11:45

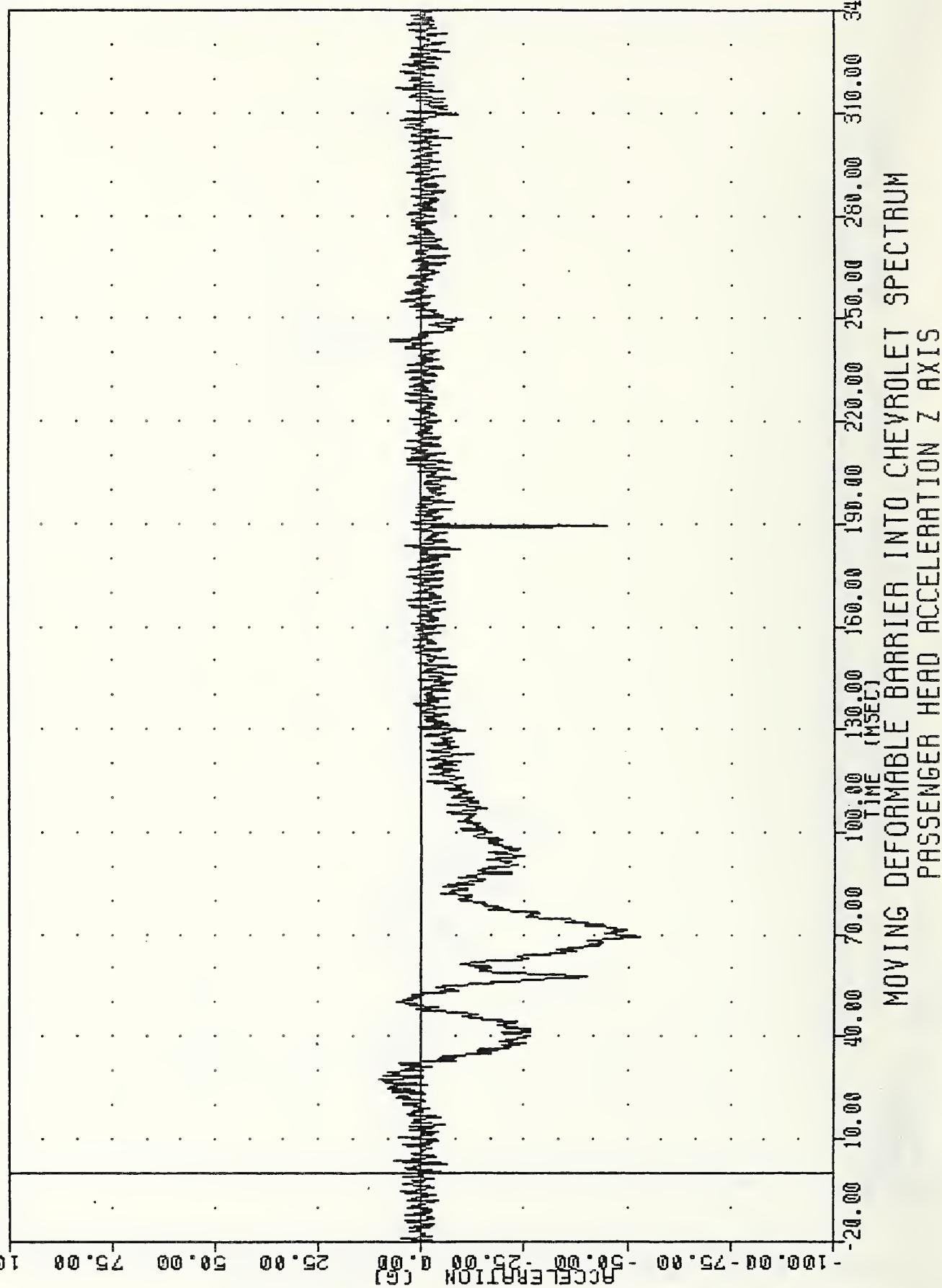
FILTER = ALPF 1650/ 5217/ -40
MIN, MAX VALUES = -26.66 e 243.50 . 45.51 e 56.38

00 100.00
85336000000
HEDY64



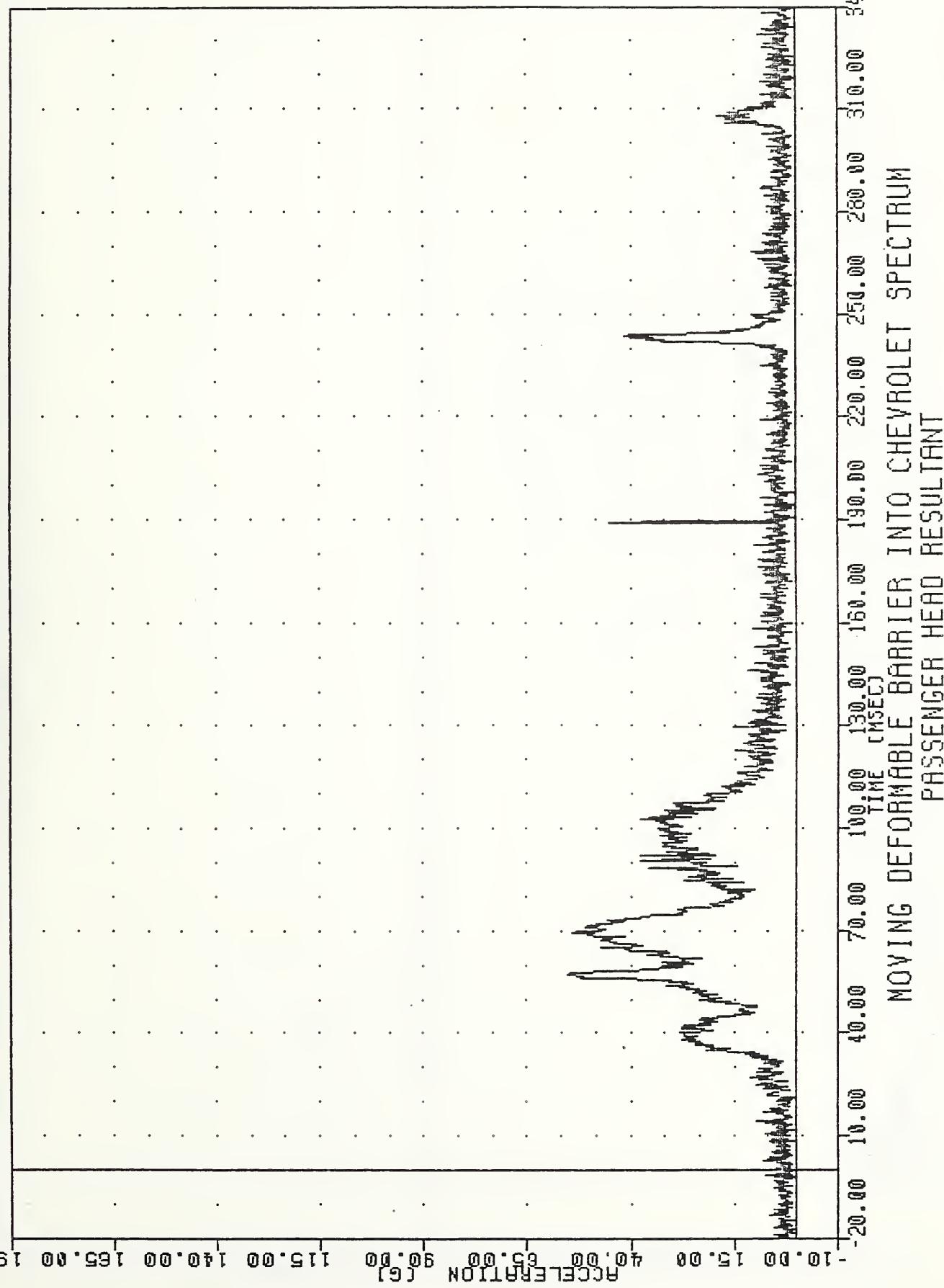
VAT
SI PROTECTION PROD VEHICLE
853360000000
HE0264

PLOT DATE 10-DEC-85 09:11:45
FILTER = ALPF 1650/ 5217 / -40
MIN. MAX VALUES = -53.08 & 69.50 , 10.33 & 27.25



VRT
SI PROTECTION PROD VEHICLE
85336000000
HEDRG4

PL01 DATE 10-DEC-85 09:11:45
FILTER = ALPF 1650/ 5217/ -40
MIN, MAX VALUES = 0.35@ 325.50@ 55.14 @ 57.38

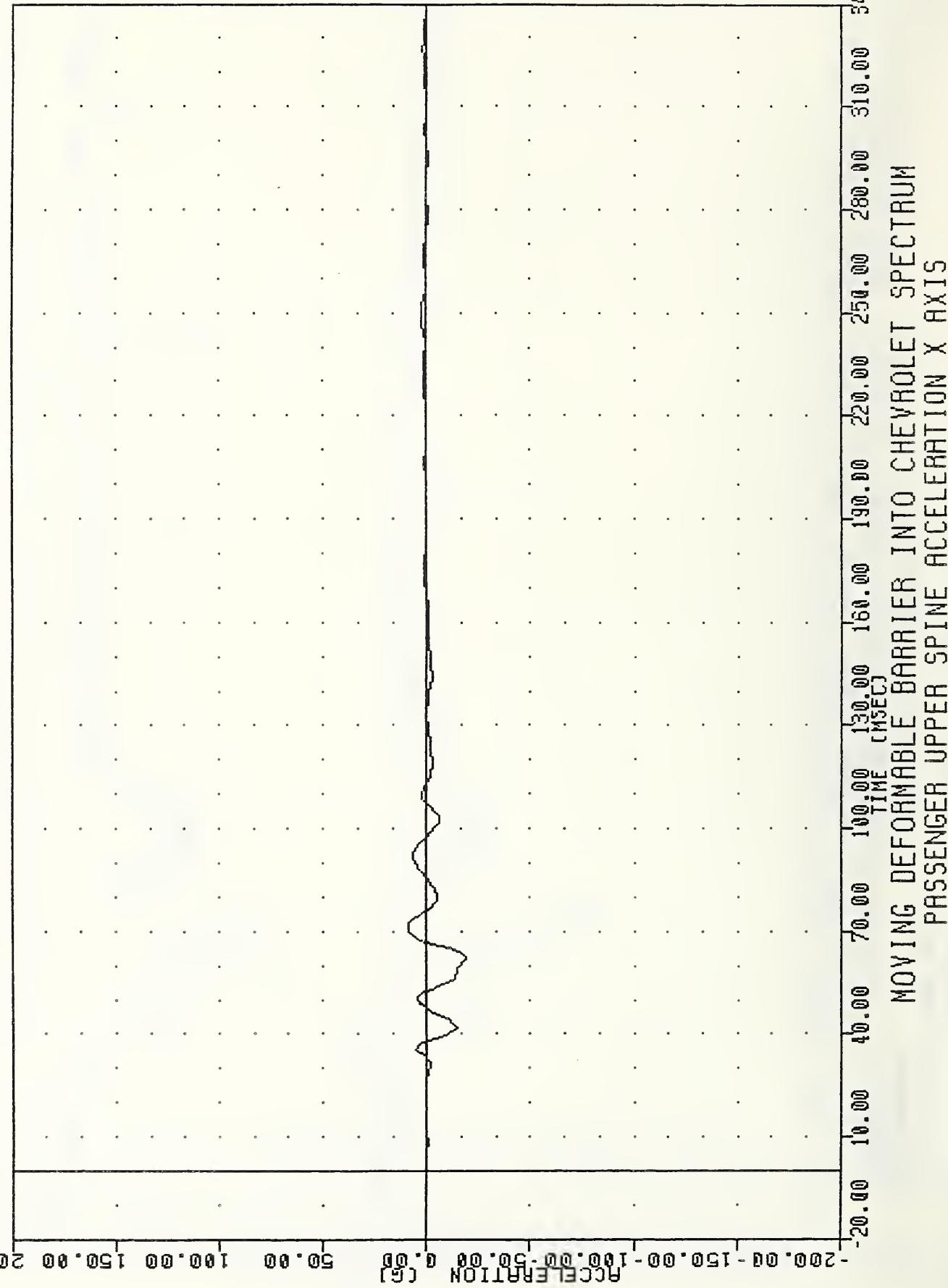


VRT
SI PROTECTION PROD VEHICLE
853360000000
T01XG4

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -18.98 e 62.50 e

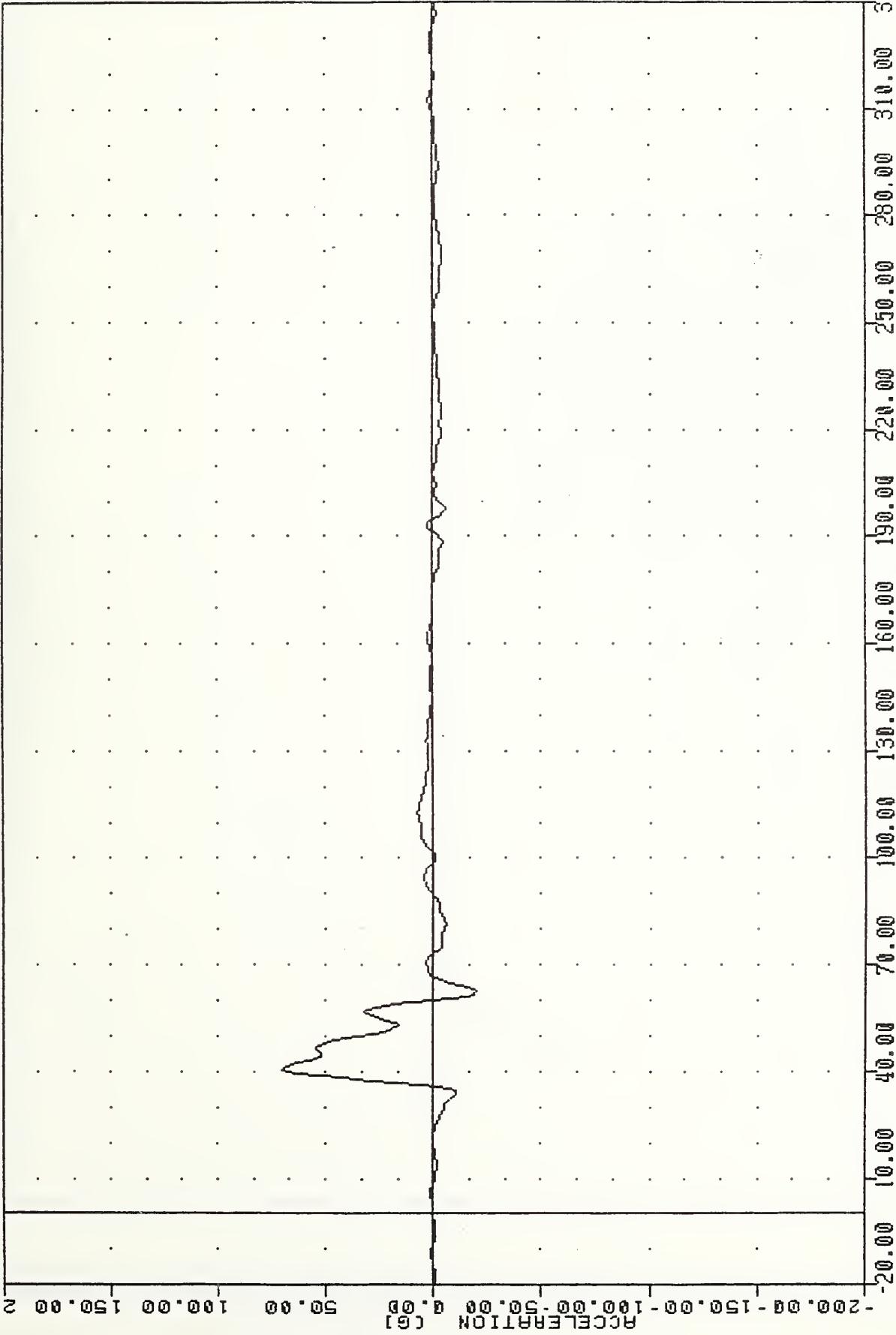
9.08 e 71.25



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER UPPER SPINE ACCELERATION X AXIS
340.00
310.00
280.00
250.00
220.00
190.00
160.00
130.00
TIME [msec]

VAT , 851202
SI PROTECTION PROD VEHICLE
853360000000
T01Y64

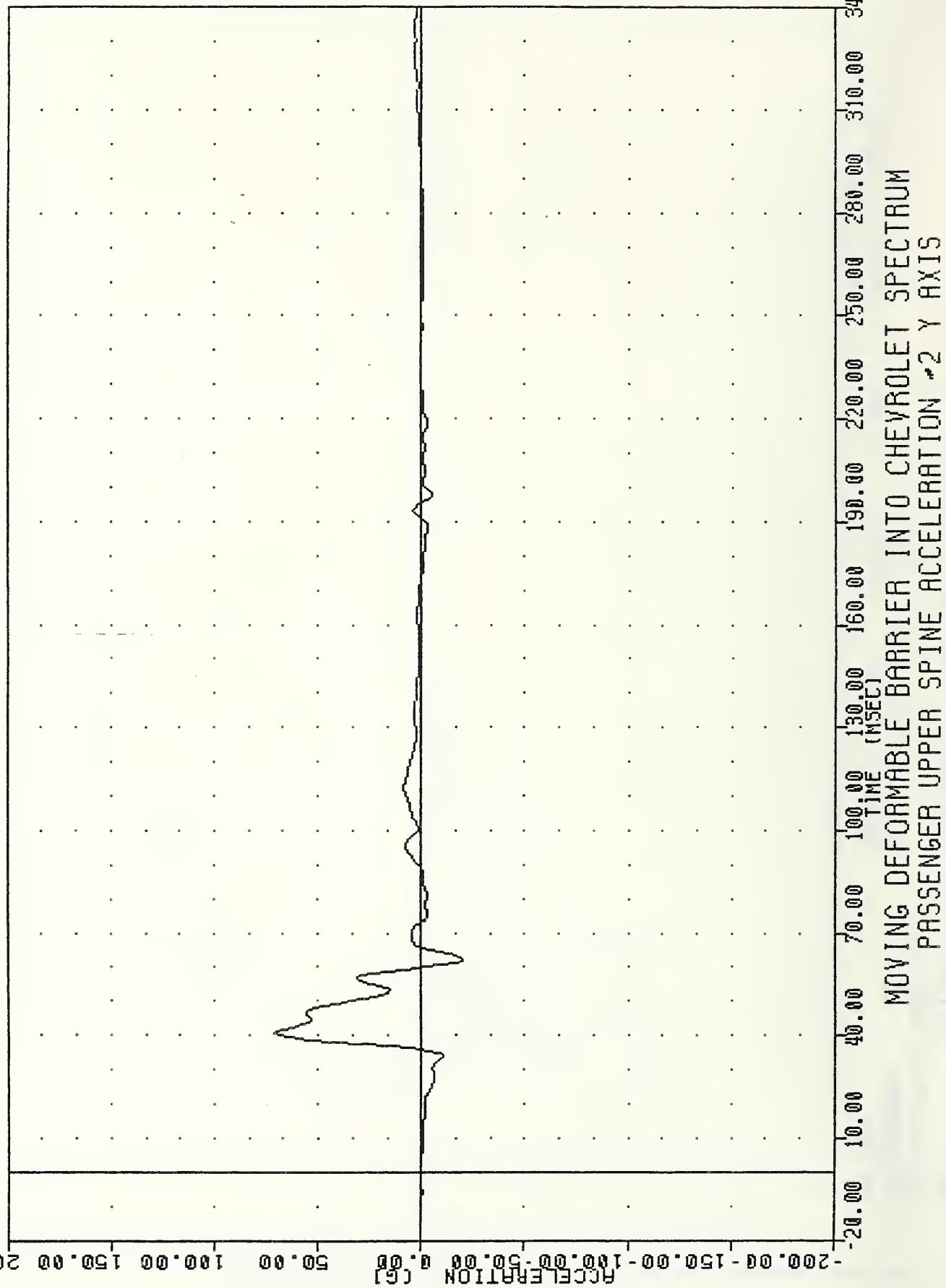
PLT DATE 10-DEC-85 09:33:16
FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -20.36 & 62.50 , 70.46 & 40.63



Moving deformable barrier into Chevrolet Spectrum
Passenger upper spine acceleration Y axis

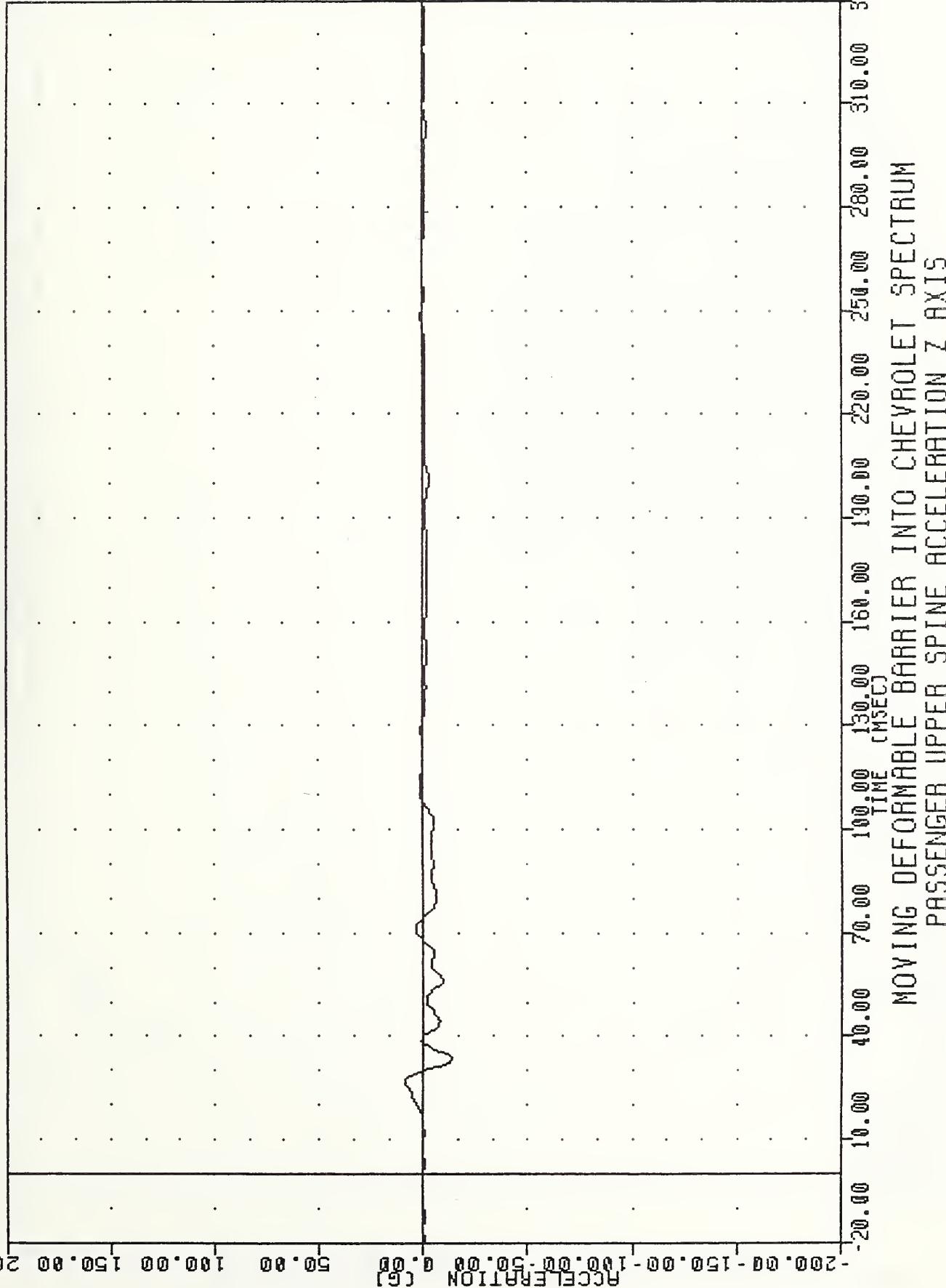
VRT
SI PROTECTION PROD VEHICLE
85336000000
T01YGD

PLOT DATE 10-DEC-85 09:33:16
FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -20.08 62.50 , 71.39 & 40.63



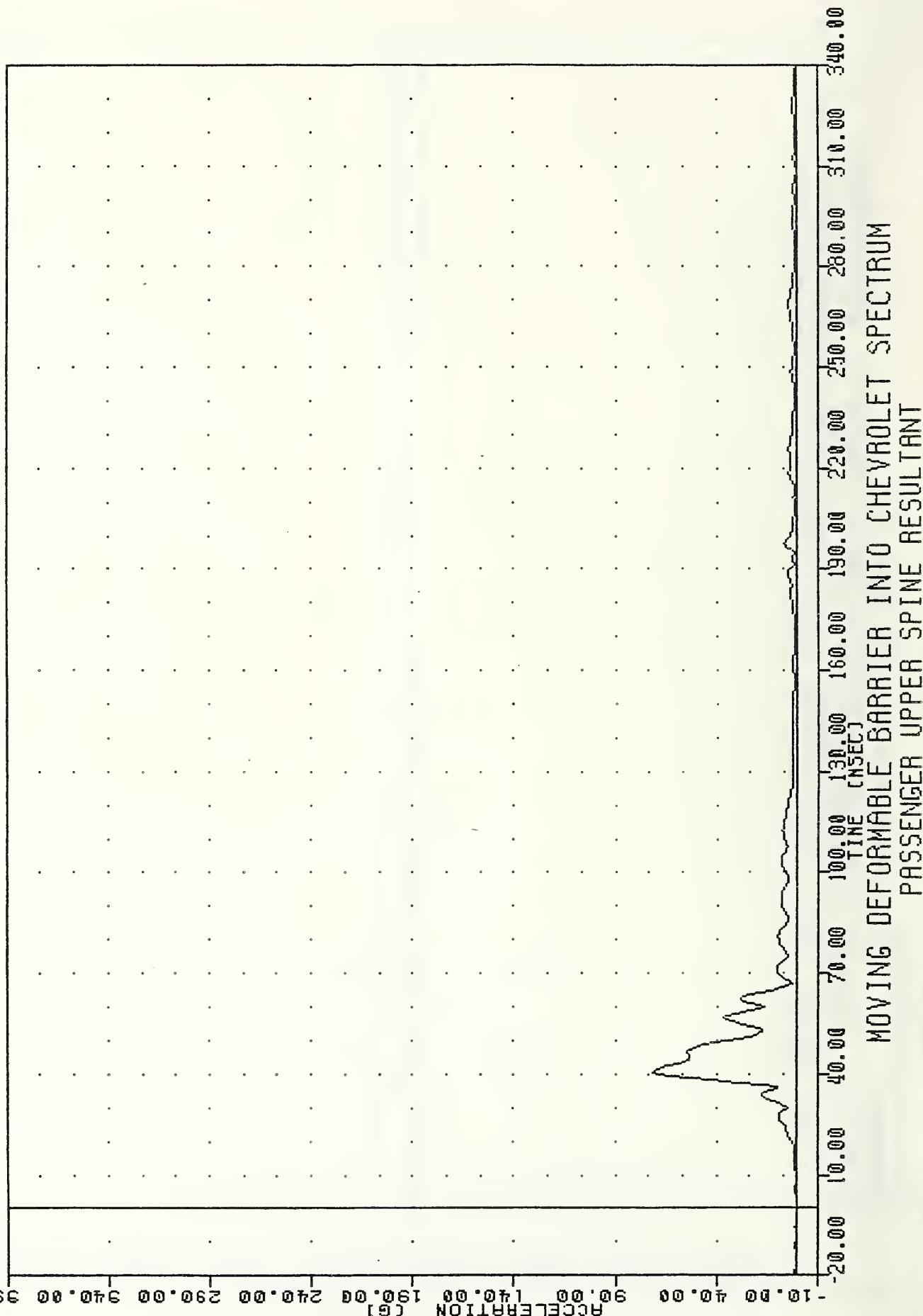
VRT 851202
SI PROTECTION PROD VEHICLE
853360@00000 T01ZG4

PLT1 DATE 10-DEC-85 09:33:16
FILIER = HSR1 136/ 189/-50
MIN, MAX VALUES = -13.68@ 33.75@ 8.74@ 26.87



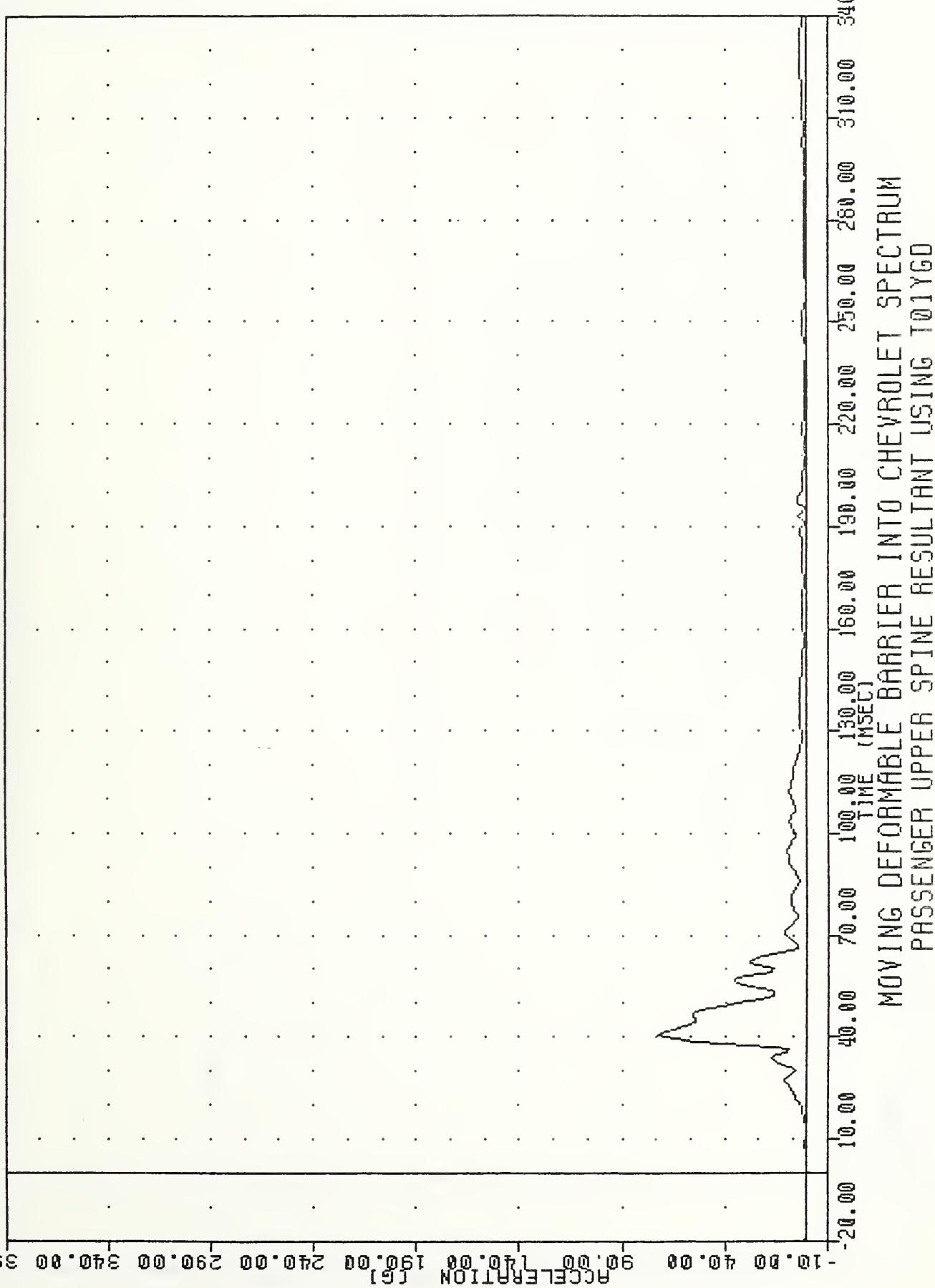
VAT
SI PROTECTION PROD VEHICLE
853360000000
T01R64

PLOT DATE 10-DEC-85 09:33:16
FILTER = HSRI 136 / 189 / -50
MIN. MAX VALUES = 0.268 -15.00 , 71.55 & 40.63



VAT , 851202
SI PROTECTION PROD VEHICLE
85336000000
T01RG0

PLOT DATE 10-DEC-85 09:33:16
FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = 0.18@ -3.13 , 72.46 @ 40.63



VAT , 851202
SI PROTECTION PROV VEHICLE
853360000000
T01YY4

PLOT DATE 10-DEC-85 09:35:14

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -1.48 e 35.63 , 20.78 e 175.63

VELOCIT Y (MPH)

00

50.00

40.00

30.00

20.00

10.00

0.00

B-46

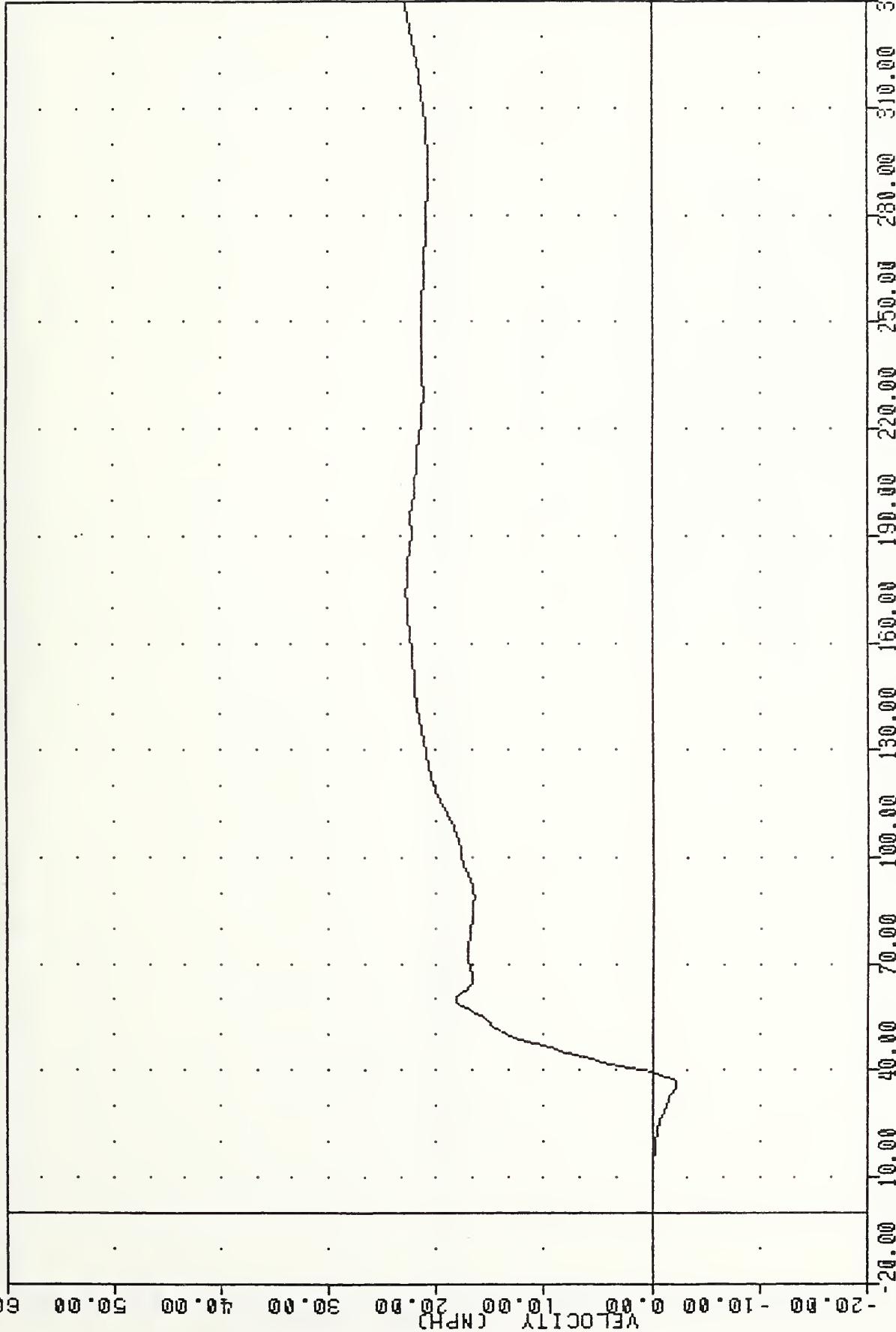
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME [NSEC]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING T01YY4

VRT 851202 PLOT DATE 10-DEC-85 09:35:14

SI PROTECTION PROD VEHICLE

85336000000
101YY0

FILTER = HSRI 136/
MIN, MAX VALUES = -2.288 35.63 • 22.86 & 340.00

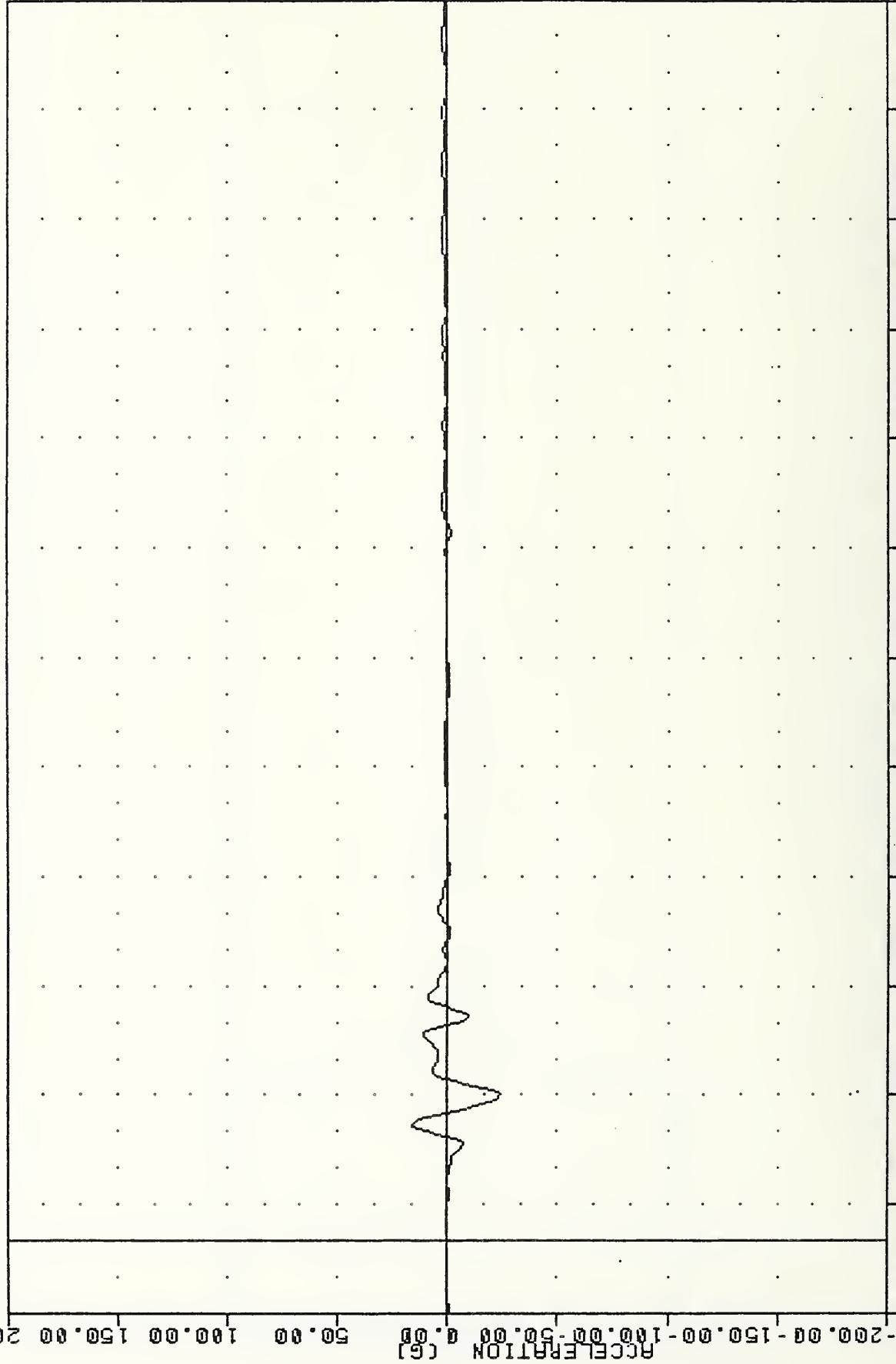


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING T@1Y6D

VRT
SI PROTECTION PROV VEHICLE
8533600000
T12XG4

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -23.71@ 40.00 , 16.67 @ 31.88

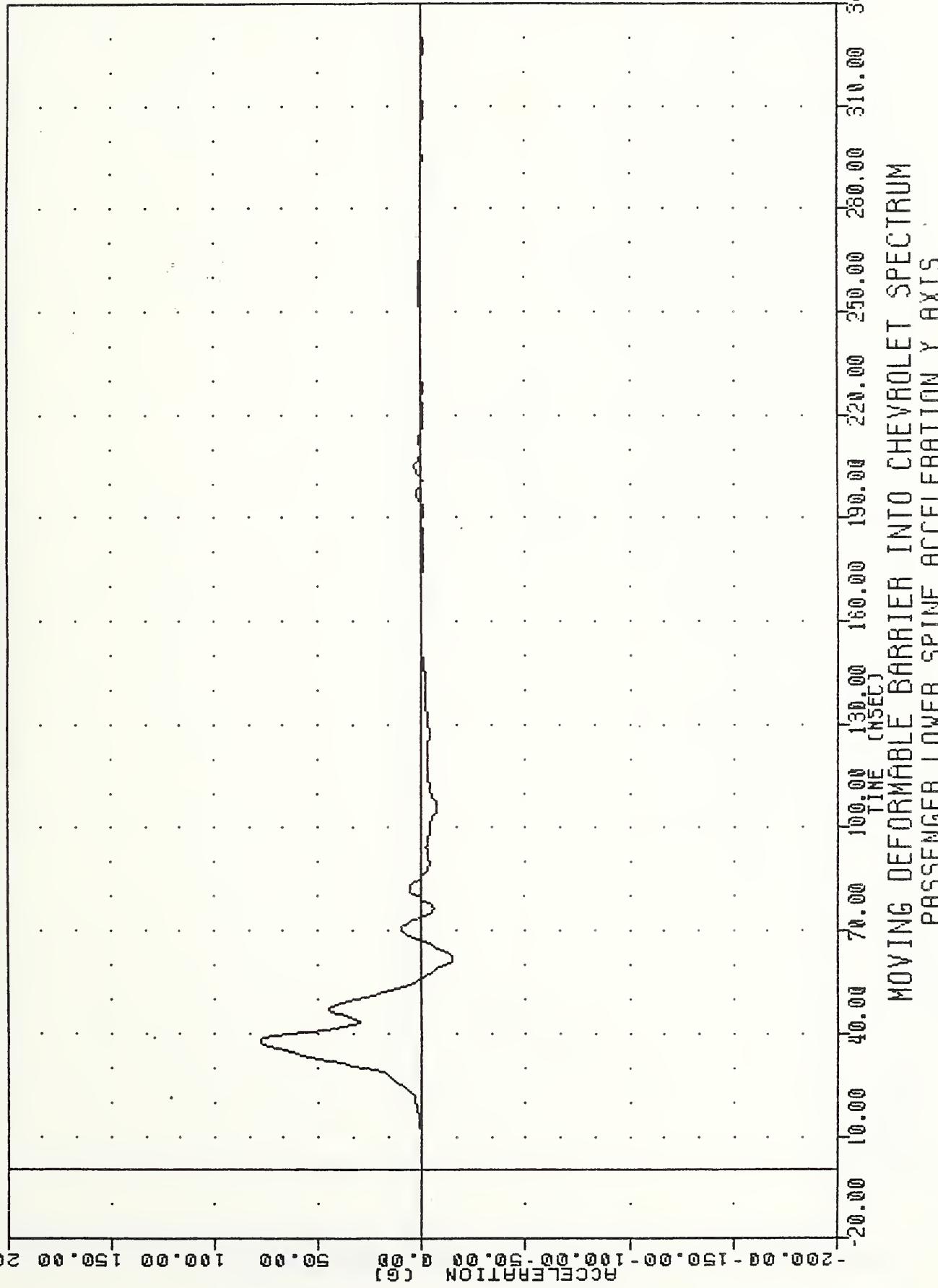


-200.00 100.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LOWER SPINE ACCELERATION X AXIS

VAT 851202
SI PROTECTION PROD VEHICLE
853360000000
T12Y64

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN. MAX VALUES = -15.05@ 61.87 . 78.19 @ 38.13

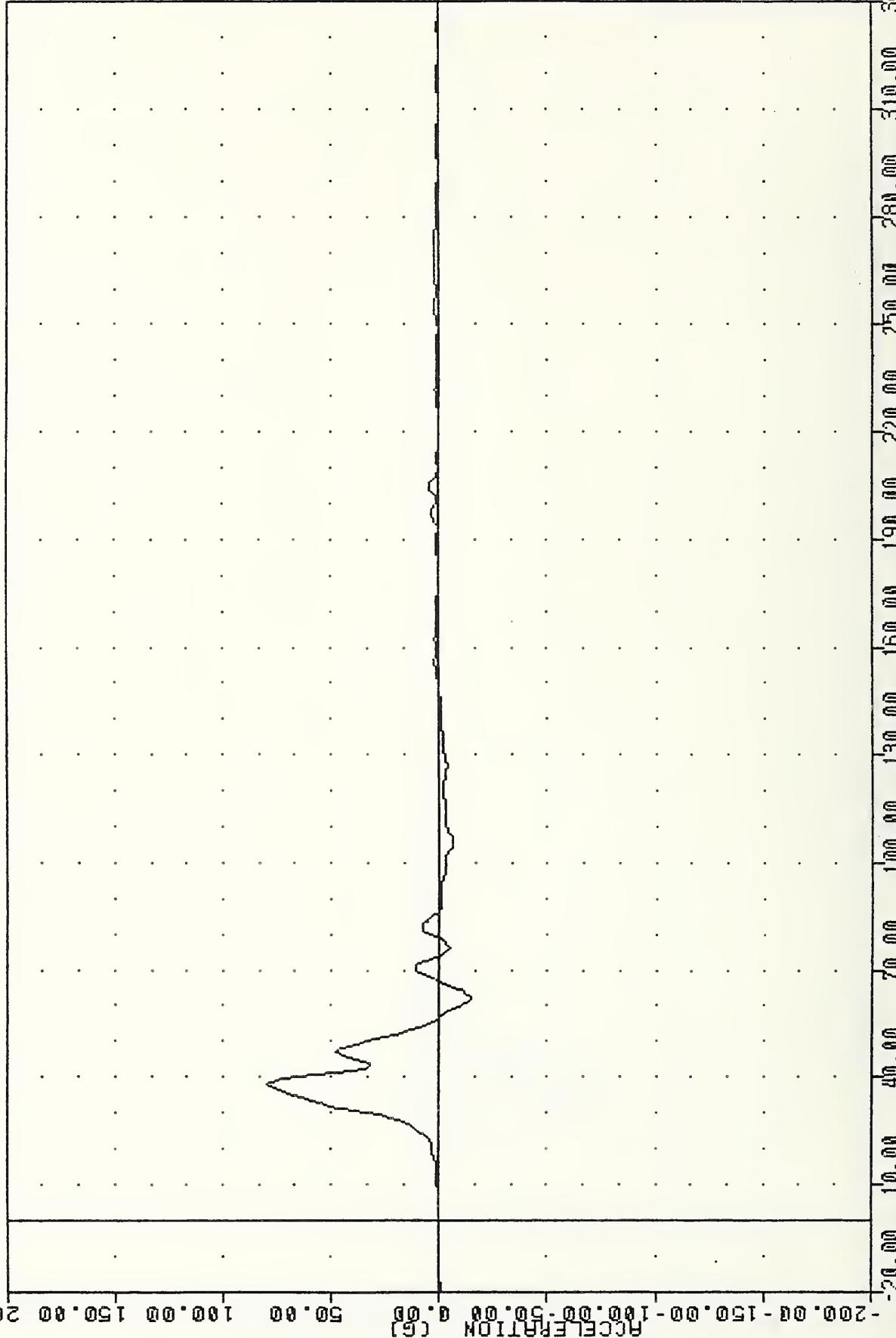


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LOWER SPINE ACCELERATION Y AXIS

VAT , 851202
SI PROTECTION PROD VEHICLE
85336000000
112Y60

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -14.33@ 61.87 . 79.38 @ 38.13

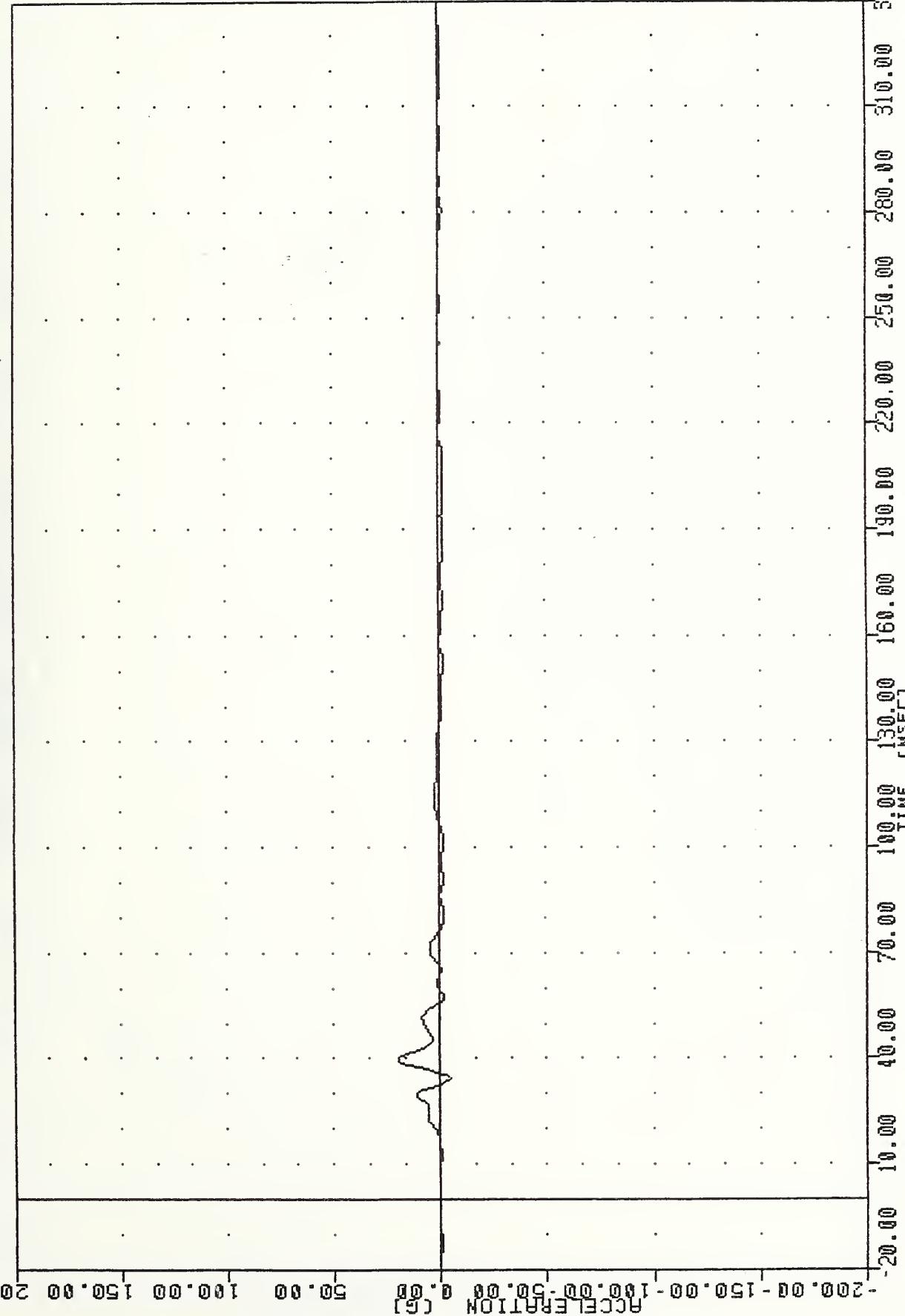


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LOWER SPINE ACCELERATION 2 Y AXIS

VRT
SI PROTECTION PROD VEHICLE
85336000000
T12Z64

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -5.048 34.38 . 19.34 & 39.38

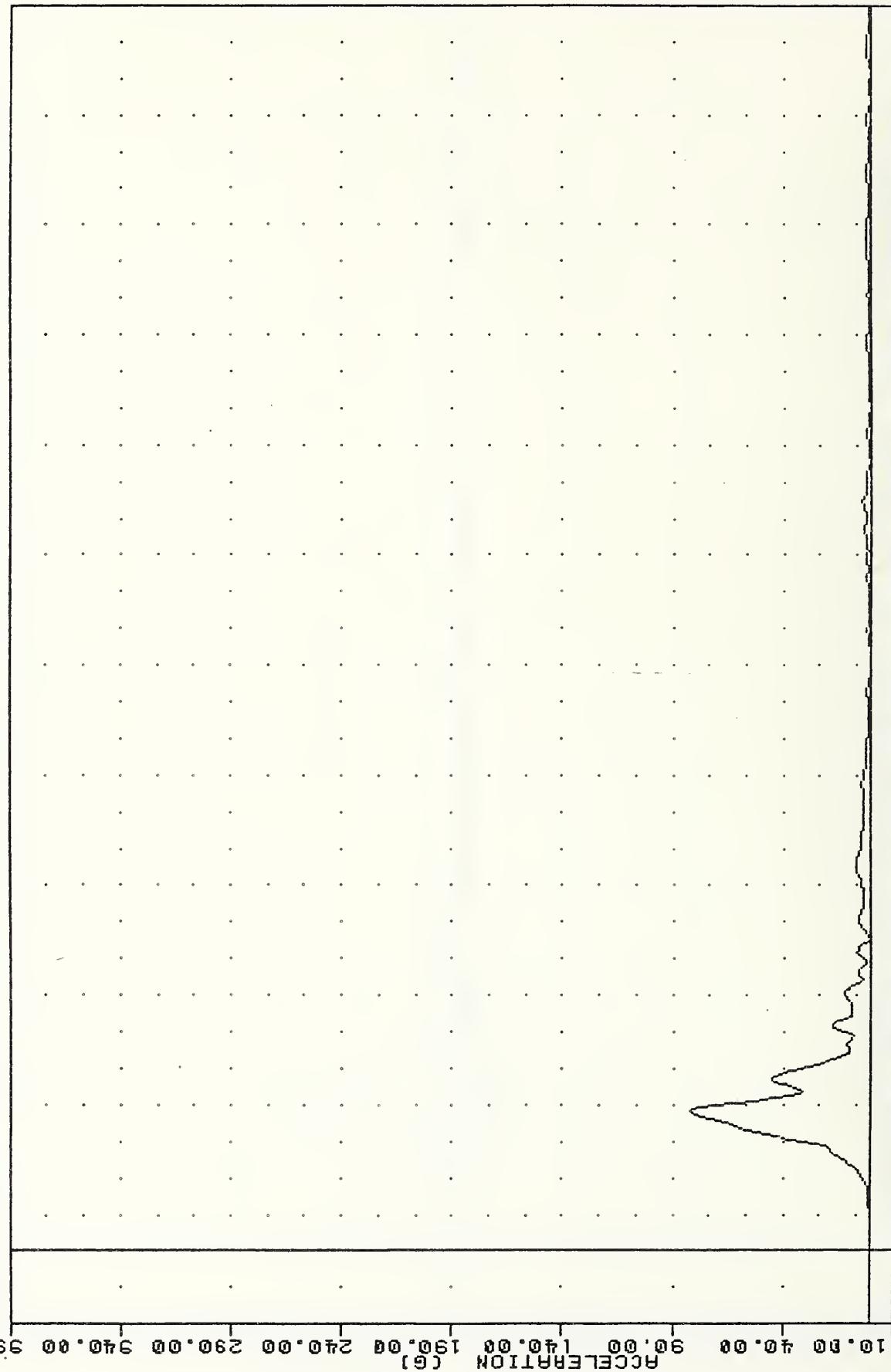


-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00
TIME [MSEC]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LOWER SPINE ACCELERATION Z AXIS

VAT , 851202
SI PROTECTION PROD VEHICLE
85336000000
T12RB4

PLOT DATE 10-DEC-85 09:33:16

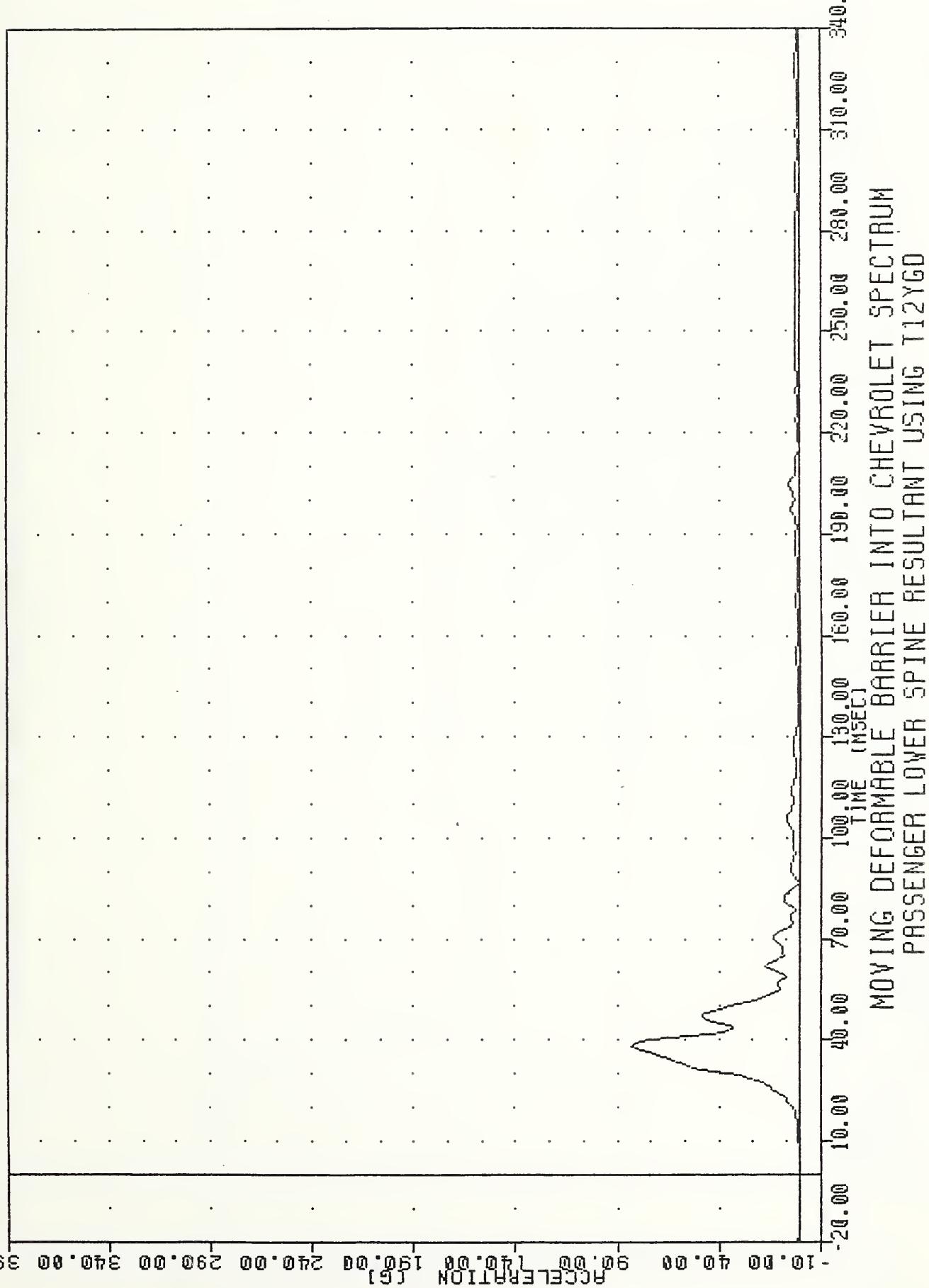
FILTER = HSRI 136/ 189/-50
MIN. MAX VALUES = 0.248 -16.25 , 81.88 & 33.13



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME [SEC]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LOWER SPINE RESULTANT

VRT
SI PROTECTION PROD VEHICLE
85336000000
T12RGD

PLOT DATE 10-DEC-85 09:33:16
FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = 0.31@ 86.88.
63.02 @ 38.13

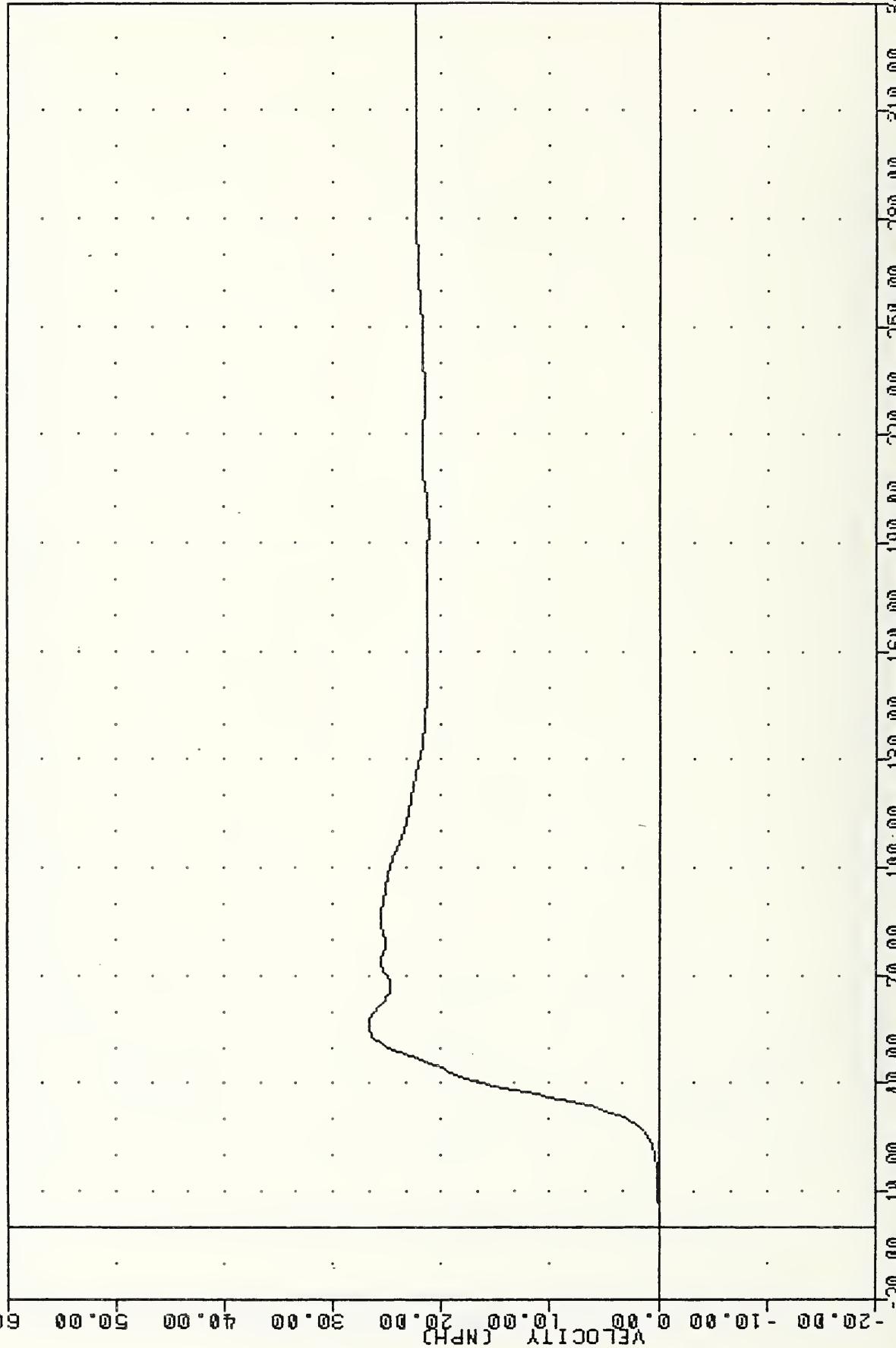


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LOWER SPINE RESULTANT USING T12YGD

VRT
SI PROTECTION FROM VEHICLE
8533600000
T12Y4

PLOT DATE 10-DEC-85 09:35:14

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -0.028 -4.38 , 26.66 & 56.25

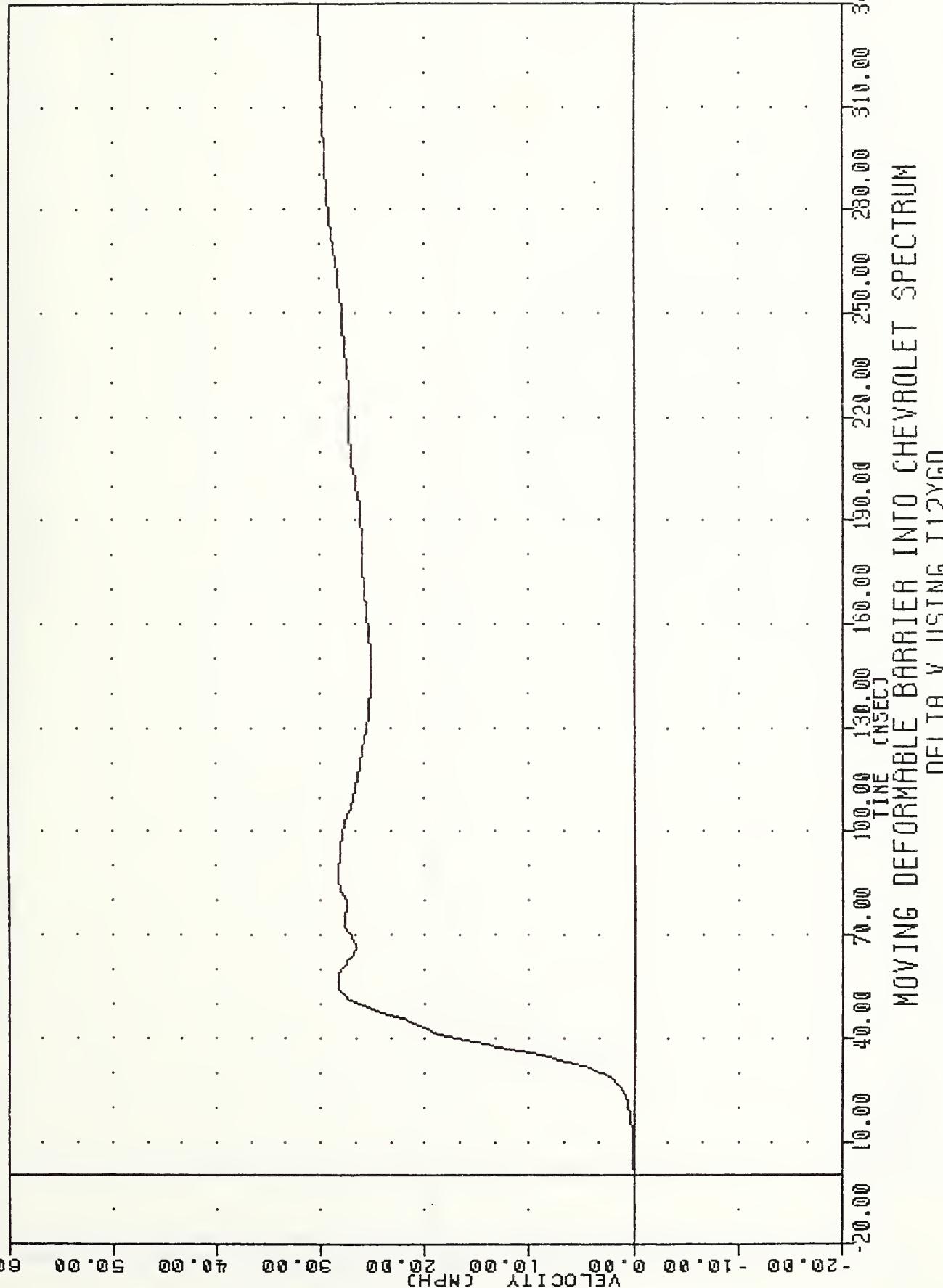


TIME (ms)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING T12Y64

VAT
SI PROTECTION PROD VEHICLE
85336000000
T12Y4D

PLT DATE 10-DEC-85 09:35:14

FILTER = HSR1 136/ 189/-50
MIN, MAX VALUES = -0.06 & -11.88 , 30.22 & 340.00

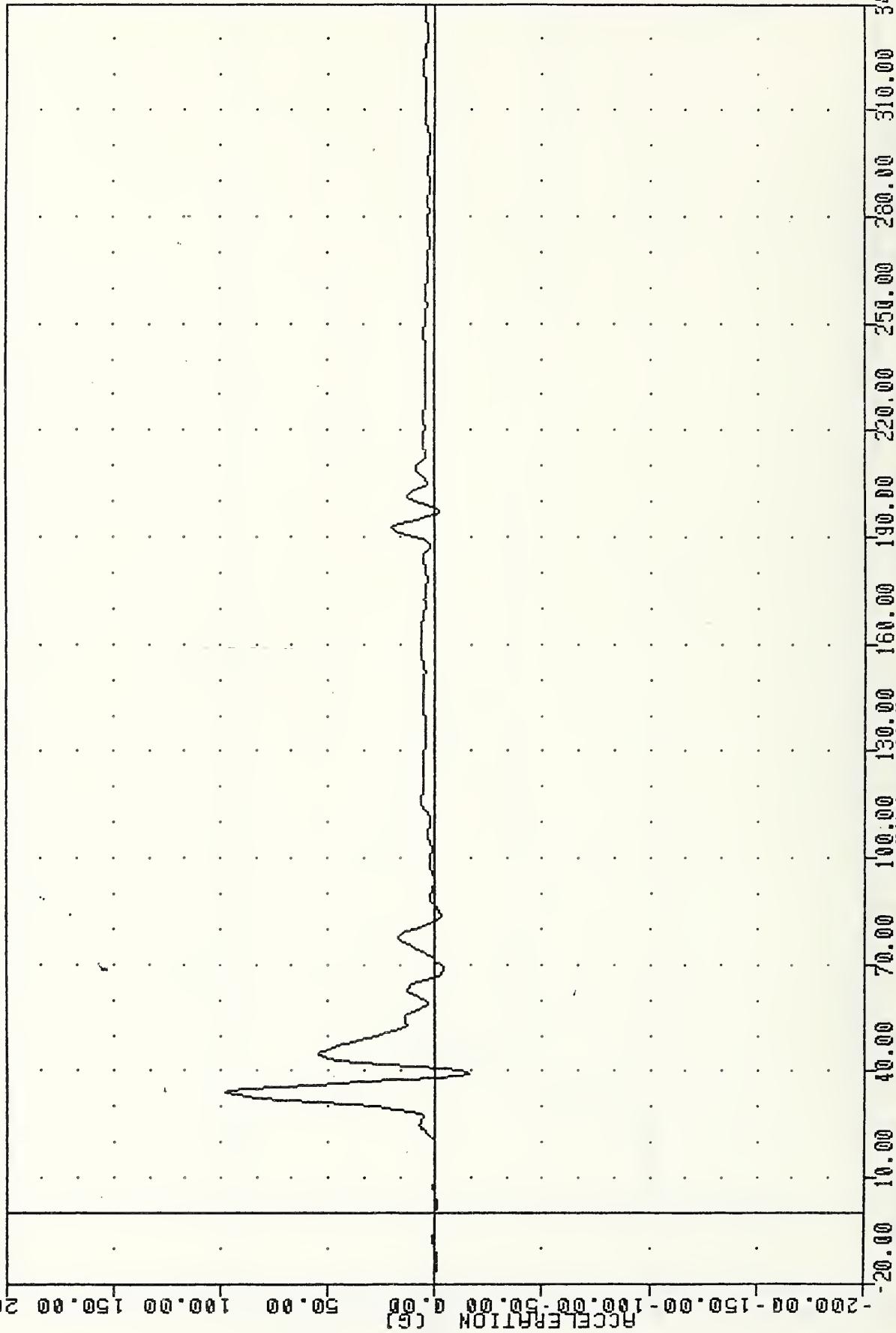


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING T12Y6D

YR1
SI PROTECTION PROD VEHICLE
8533600000
LURYG4

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN. MAX VALUES = -15.25@ 39.36 , 97.32 @ 33.75



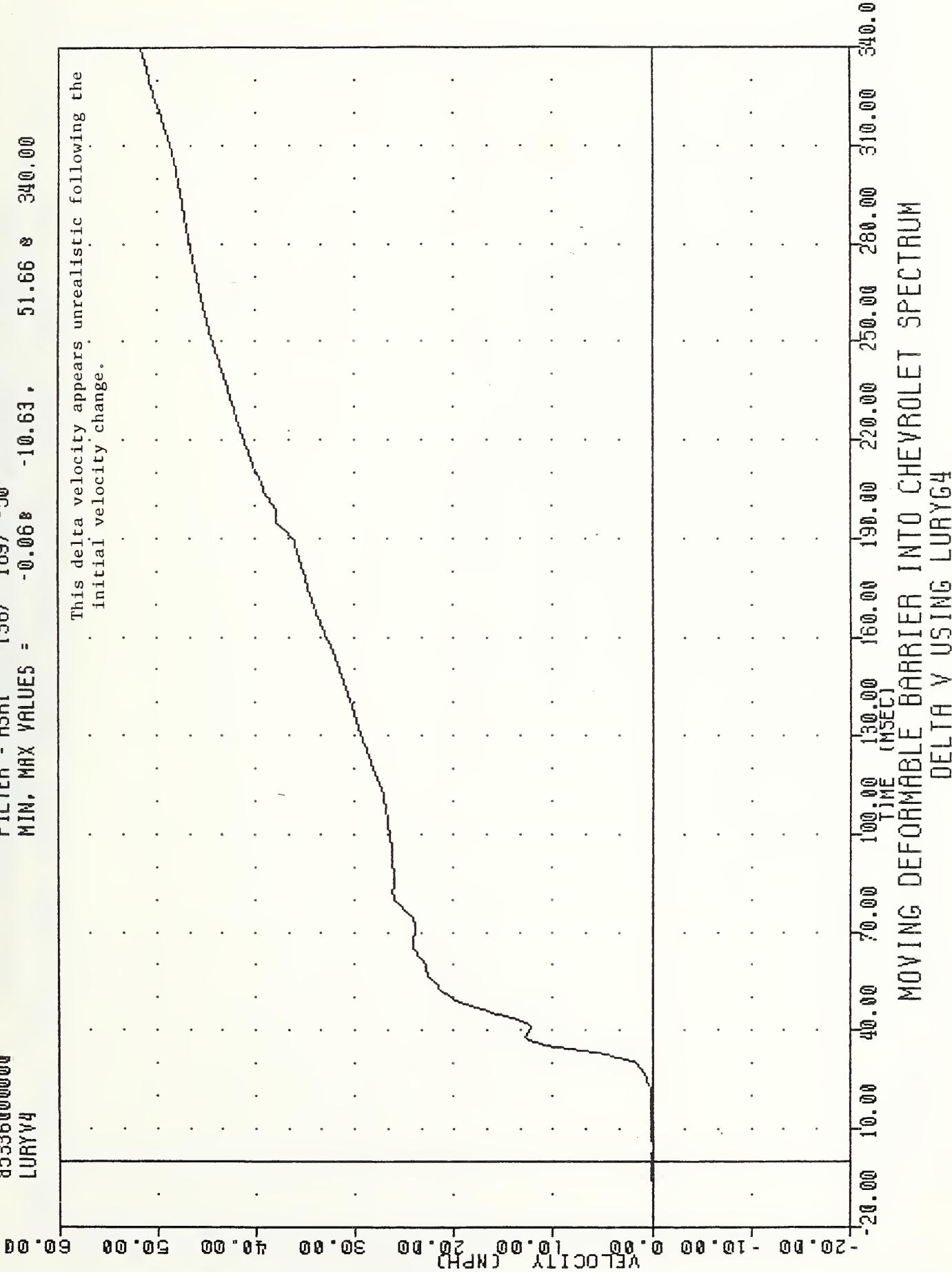
Moving deformable barrier into Chevrolet Spectrum
Passenger left upper rib acceleration Y axis

VRT
SI PROTECTION PROD VEHICLE
85336@00000
LURYV4

PLOT DATE 10-DEC-85 09:35:14

FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -0.068 -10.63 , 51.66 & 340.00

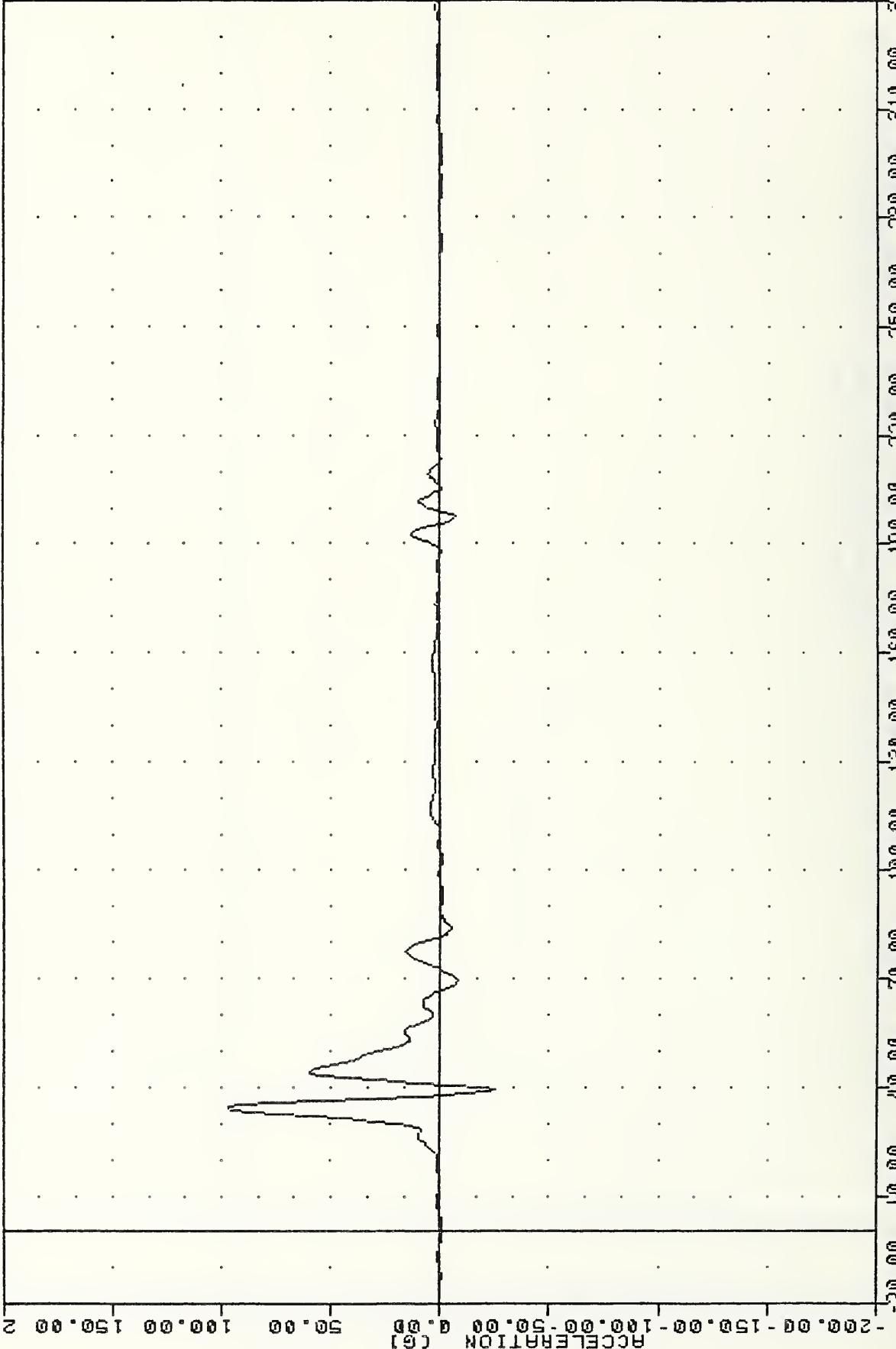
This delta velocity appears unrealistic following the initial velocity change.



VAT , 851202
SI PROTECTION PROD VEHICLE
8536000000
LURVED

PLOT DATE 10-DEC-85 09:33:16

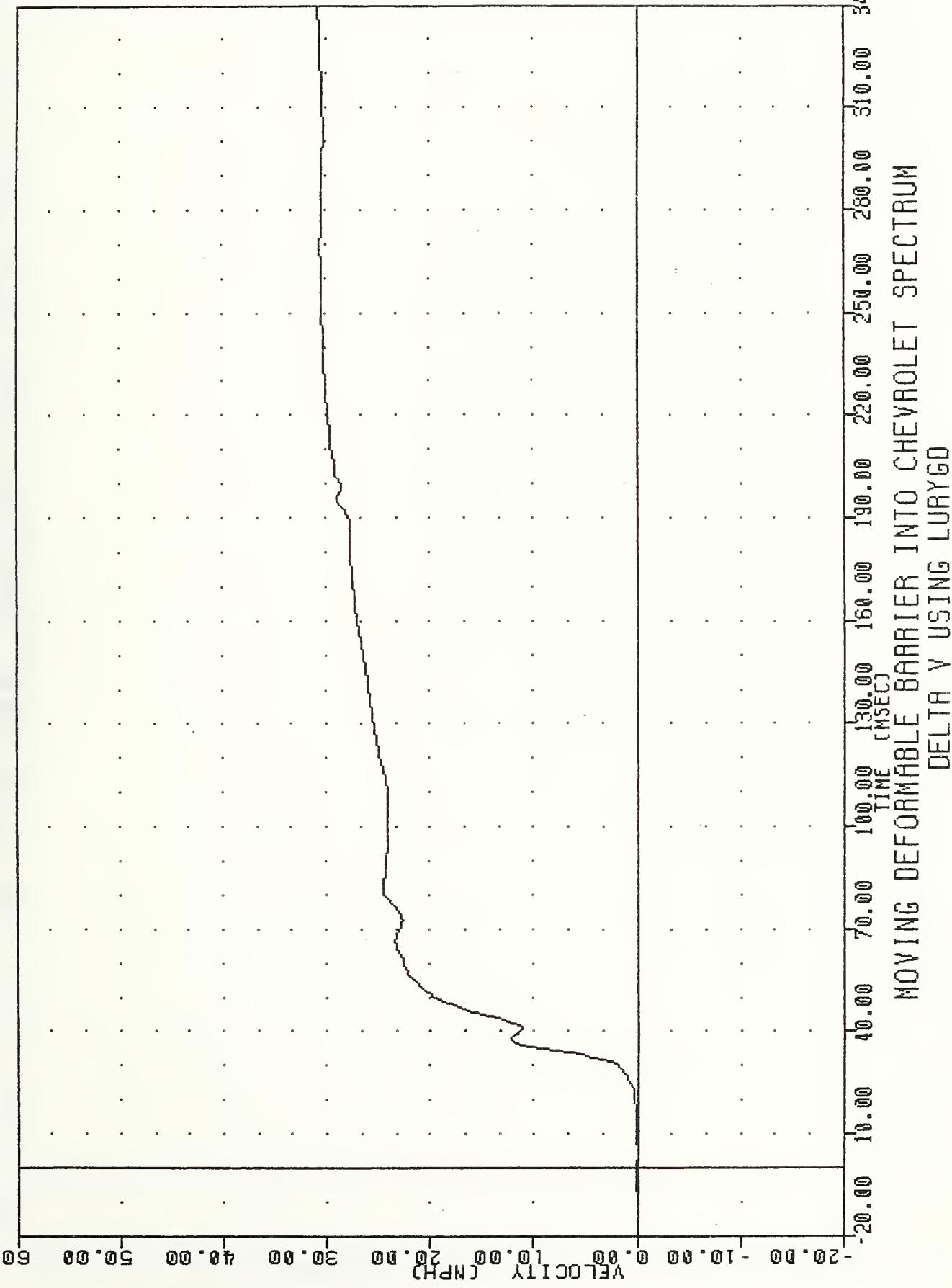
FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -24.91@ 39.38 , 97.23 @ 34.38



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME [msec]
MOVING DEFURMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LEFT UPPER RIB ACCELERATION #2 Y AXIS

VRT , 851202
SI PROTECTION PROD VEHICLE
85336000000
LURYD

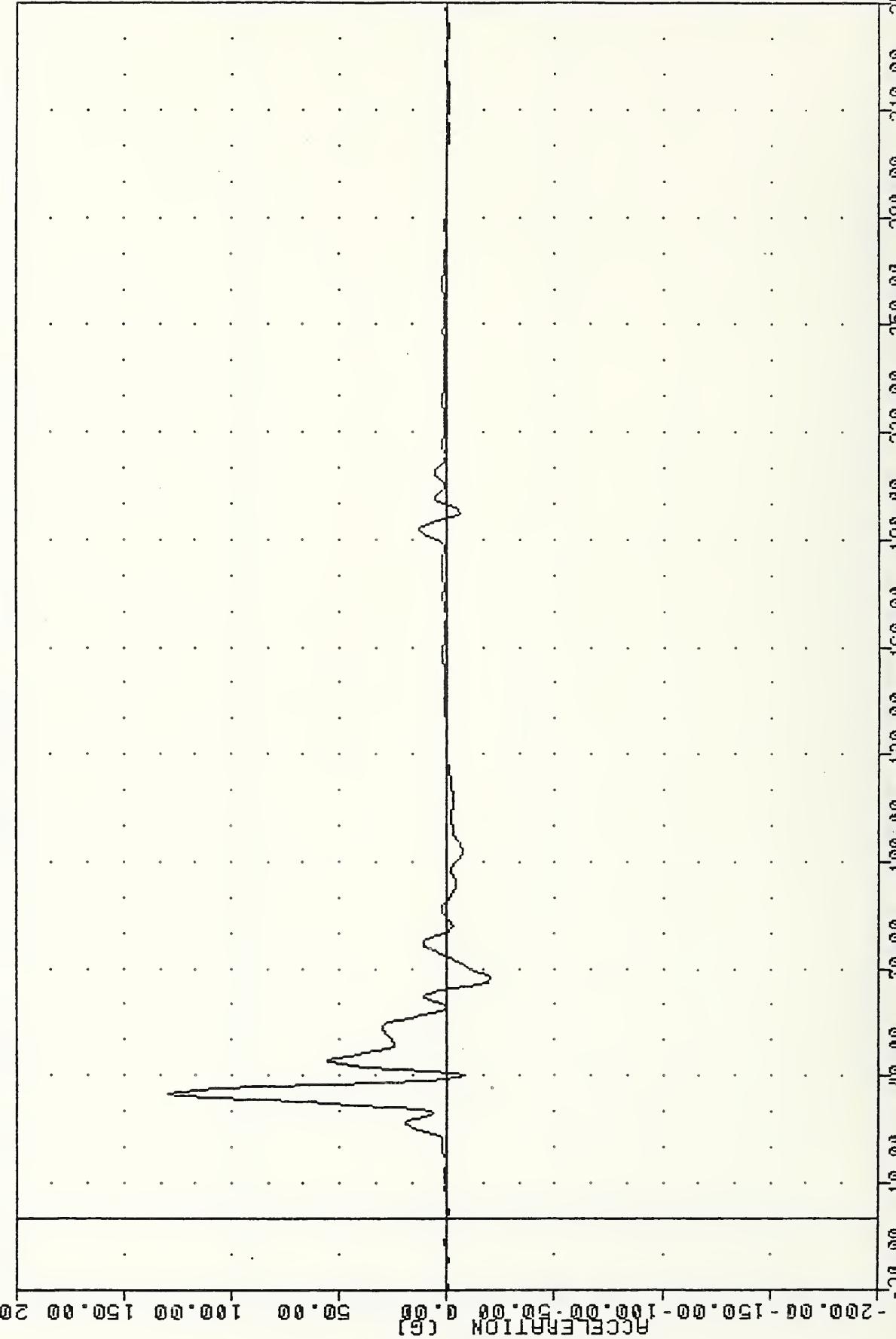
PLOT DATE 10-DEC-85 09:35:14
FILTER = HSRI 136/ 189/ -50
MIN, MAX VALUES = -0.038 -10.00 , 30.94 & 340.00



YRT 851202
SI PROTECTION PROD VEHICLE
9533600000
LLRYG4

PLOT DATE 10-DEC-85 09:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -20.158 66.87 , 129.34 & 35.00

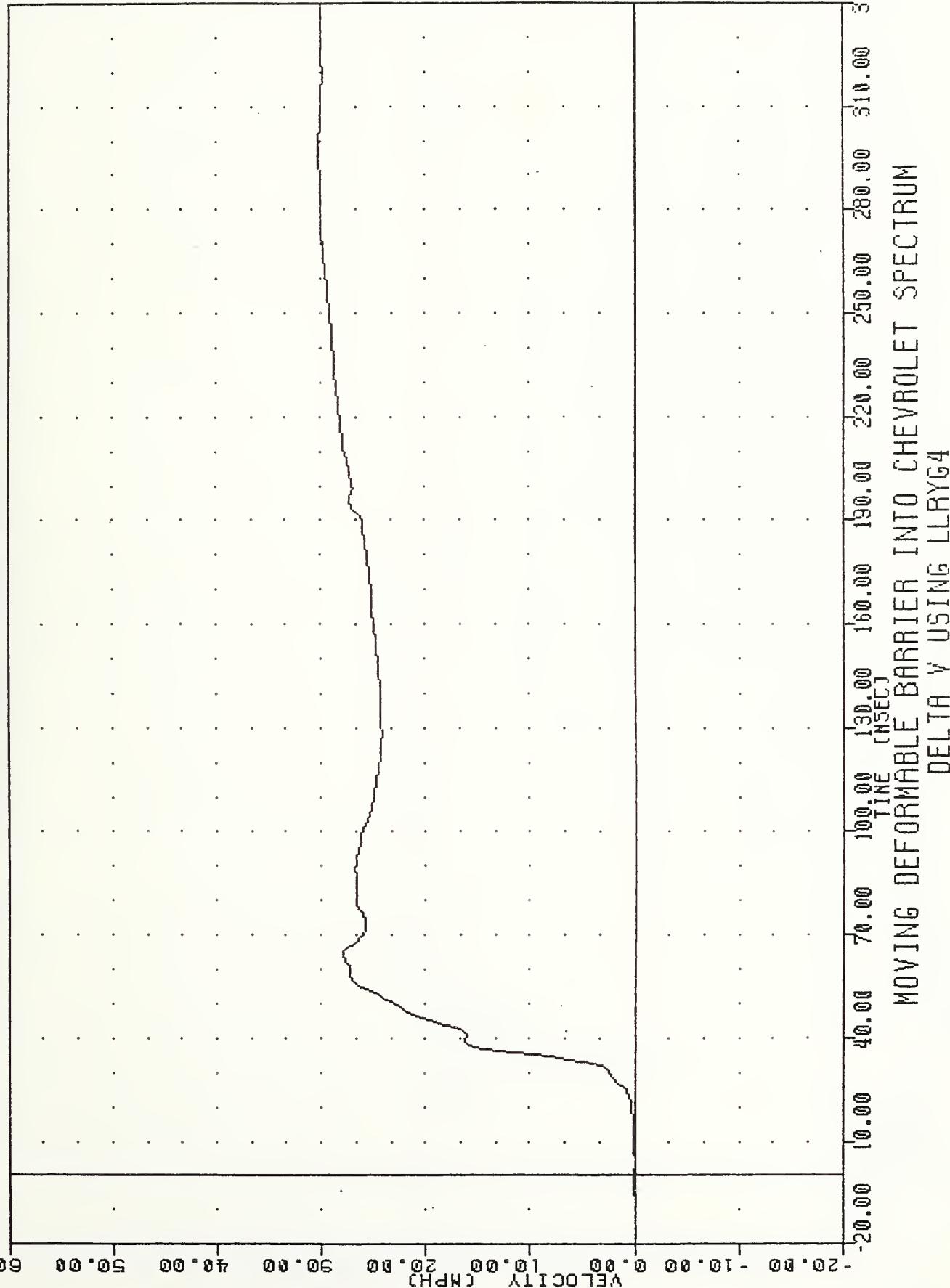


-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (msec)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LEFT LOWER RIB ACCELERATION Y AXIS

VAT , 851202
SI PROTECTION PROD VEHICLE
8533600000
LLRY4

PLOT DATE 10-DEC-85 09:35:14

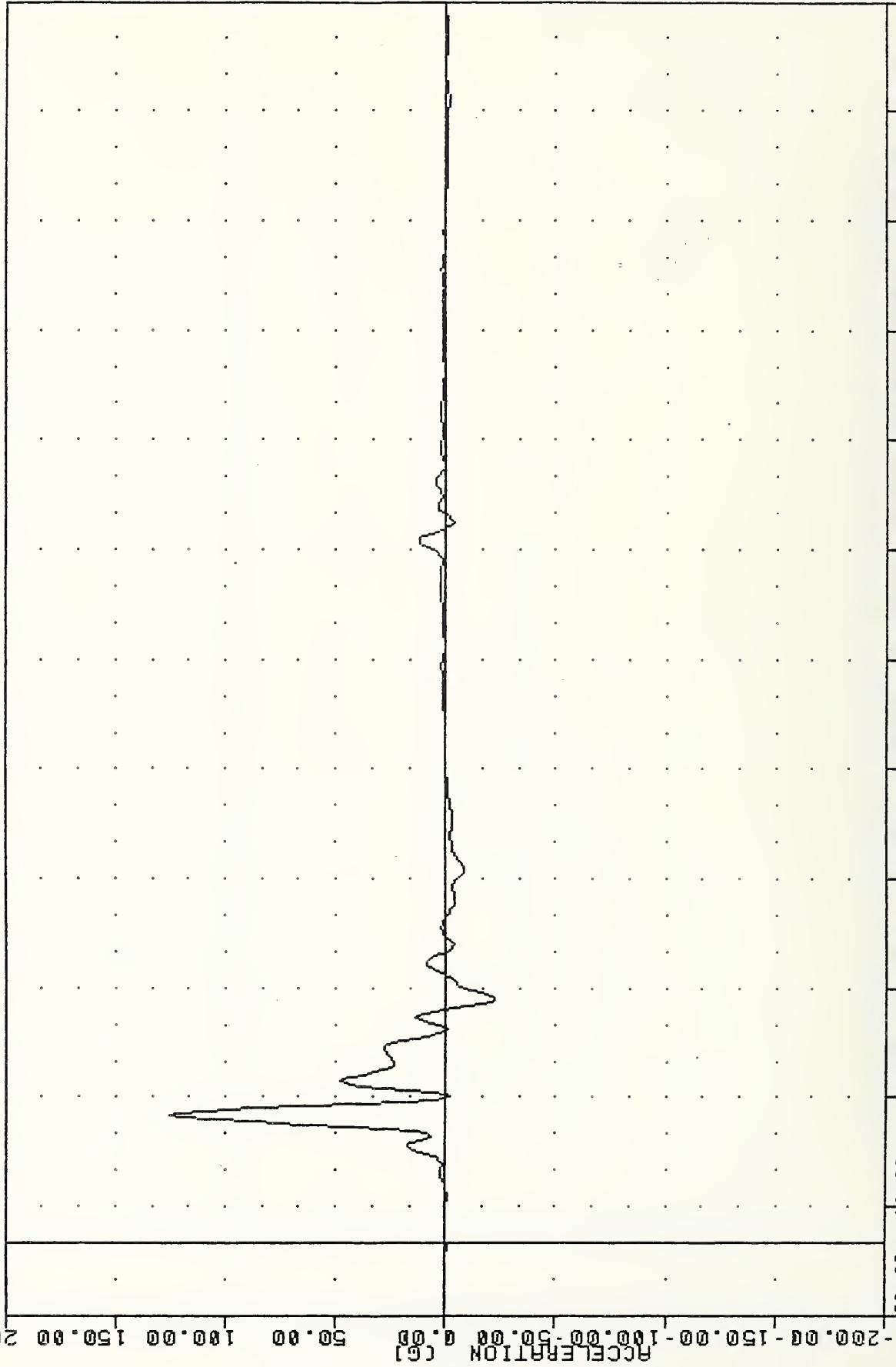
FILTER = HSRII 136/ 189/ -50
MIN, MAX VALUES = -0.04 & -10.00 , 30.16 & 295.63



YRT
SI PROTECTION PROD VEHICLE
85336000000
LLRAYGD

PLT DATE 10-DEC-85 @9:33:16

FILTER = HSRI 136/ 189/-50
MIN, MAX VALUES = -22.418 66.87 , 125.27 & 35.00



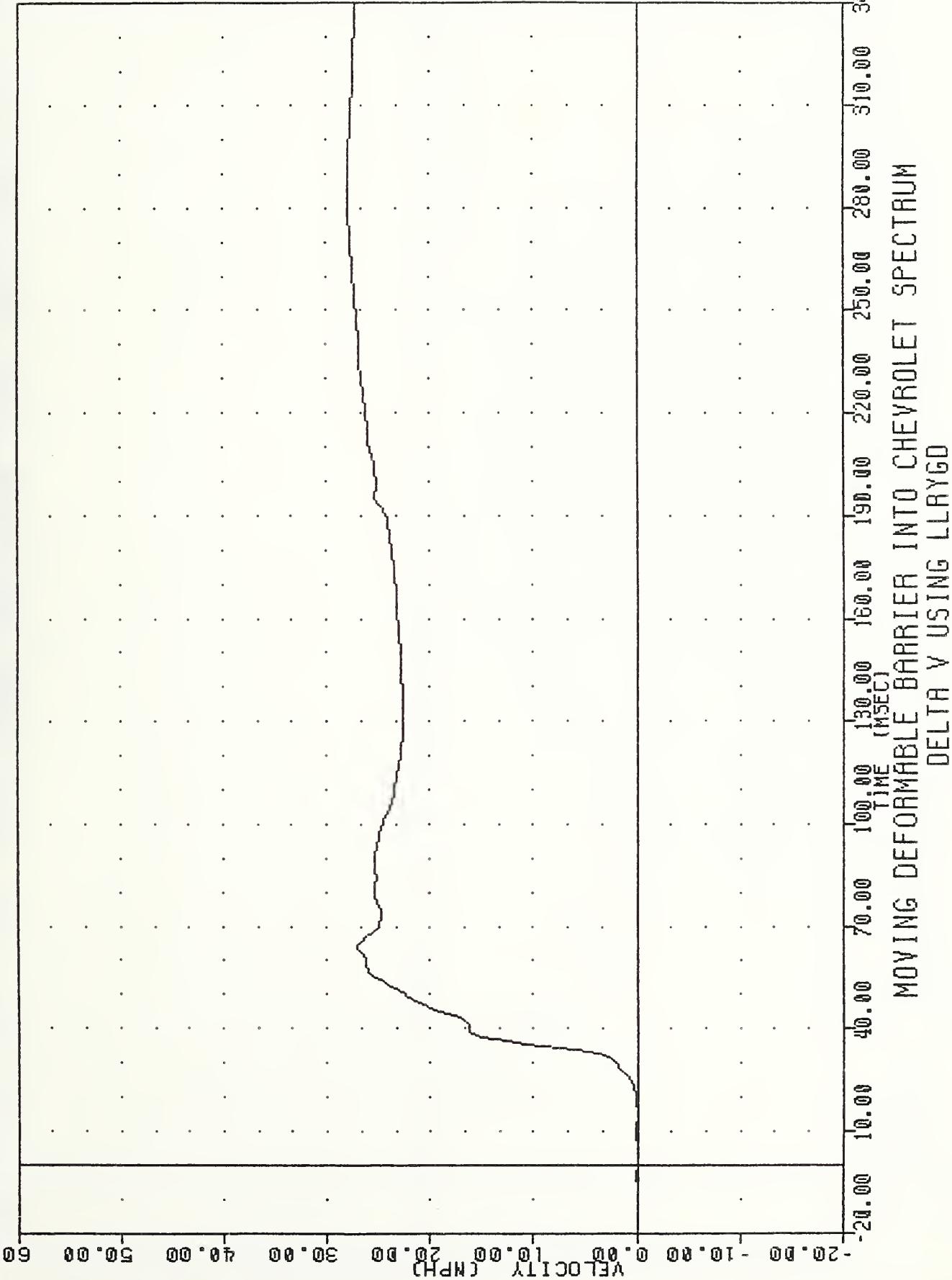
-200.00 -150.00 -100.00 -50.00 0.00 50.00 100.00 150.00 200.00
ACCELERATION
TIME (MSECS)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LEFT LOWER RIB ACCELERATION #2 Y AXIS
340.00

VRT , 851202
SI PROTECTION PROD VEHICLE
8533600000
LLRYGD

PLOT DATE 10-DEC-85 09:35:14

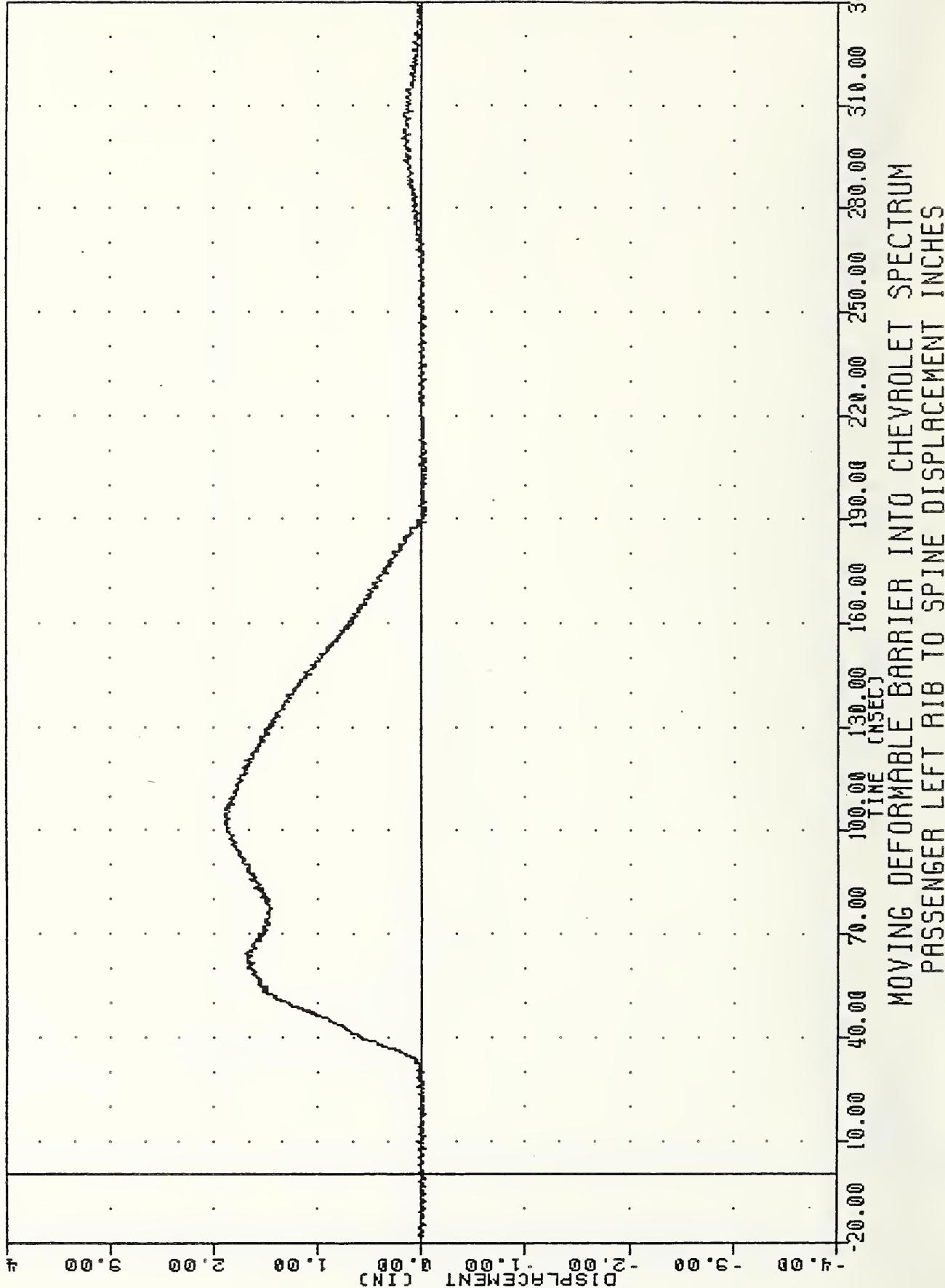
FILTER = HSRI 136/
MIN. MAX VALUES = -0.018 1.88 ,

27.94 @ 287.50



VAT , 851202
SI PROTECTION PROD VEHICLE
853360000000
LATY04

PLOT DATE 10-DEC-85 09:11:45
FILTER = ALPF 1650 / 5217/ -40
MIN, MAX VALUES = -0.05@ 205.13 , 1.90 @ 104.75



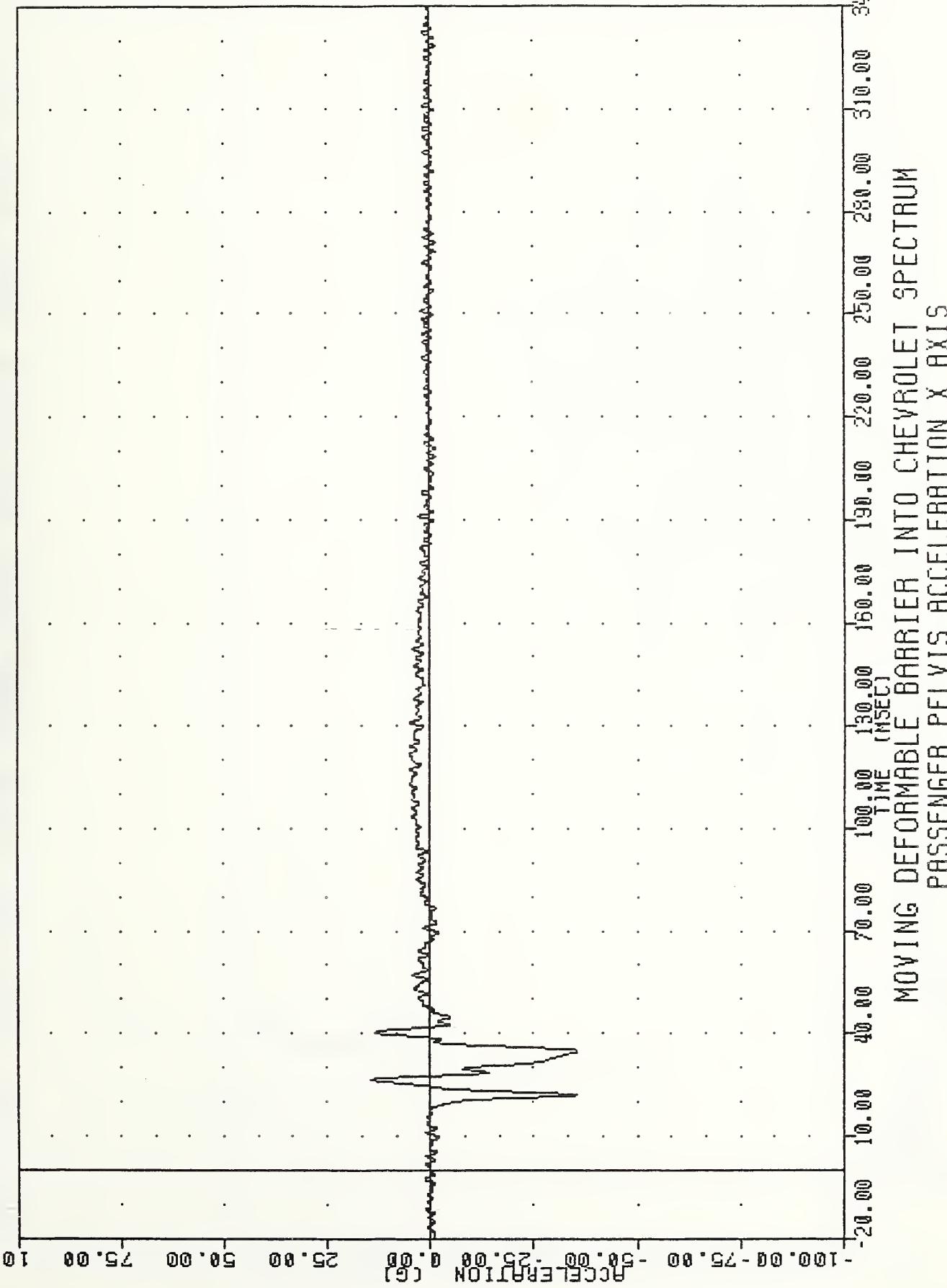
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER LEFT RIB TO SPINE DISPLACEMENT INCHES

VRT , 851202 PLOT DATE 10-DEC-85 09:11:45

SI PROTECTION PROD VEHICLE

85336000000 PEVXG4

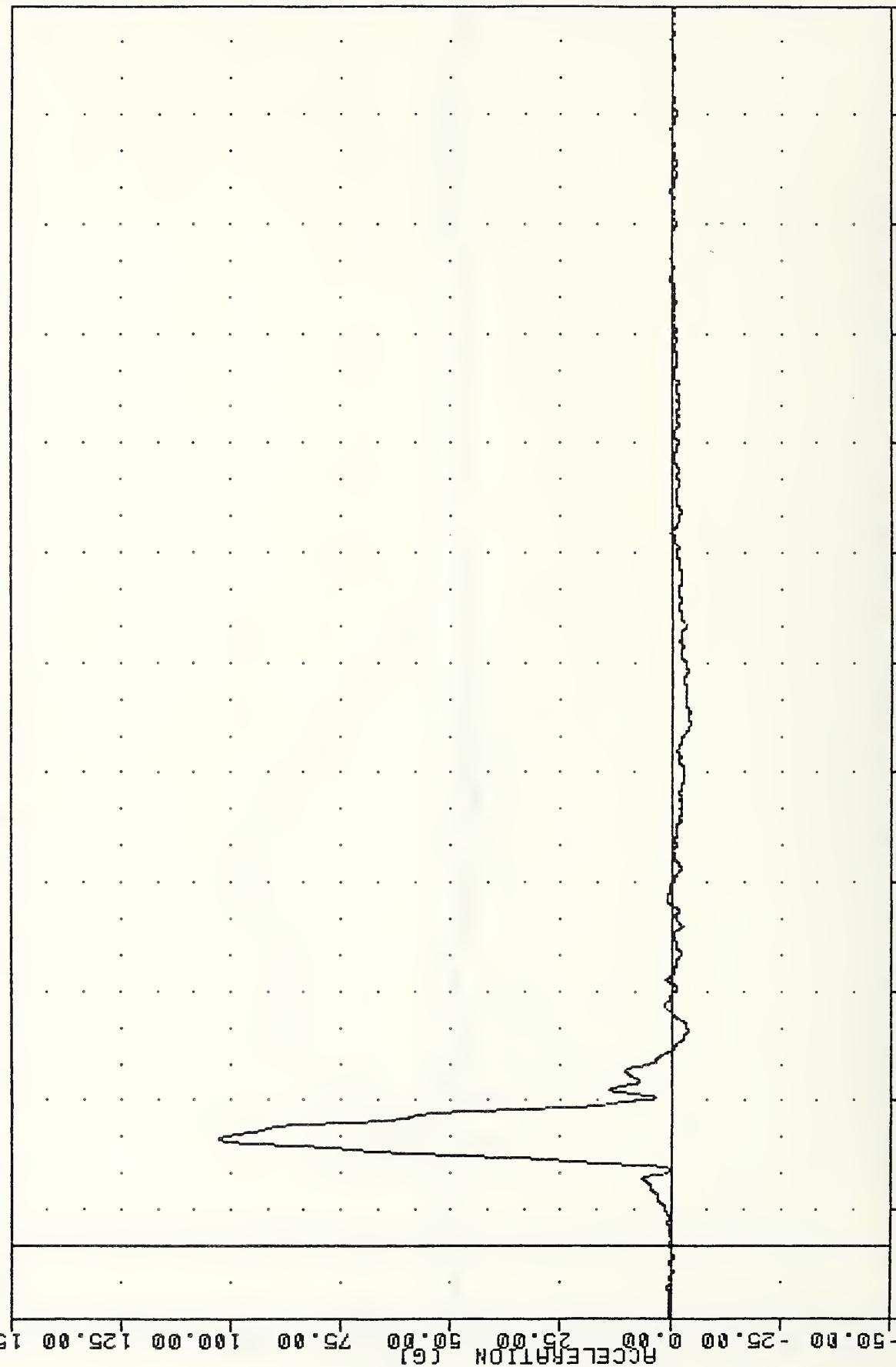
FILTER = BLPF 3000/ 949/-40
MIN. MAX VALUES = -35.66@ 34.75@ 14.23@ 26.36



VRT
SI PROTECTION PAD VEHICLE
8533600000
PEVY64

PL01 DATE 10-DEC-85 @9:11:45

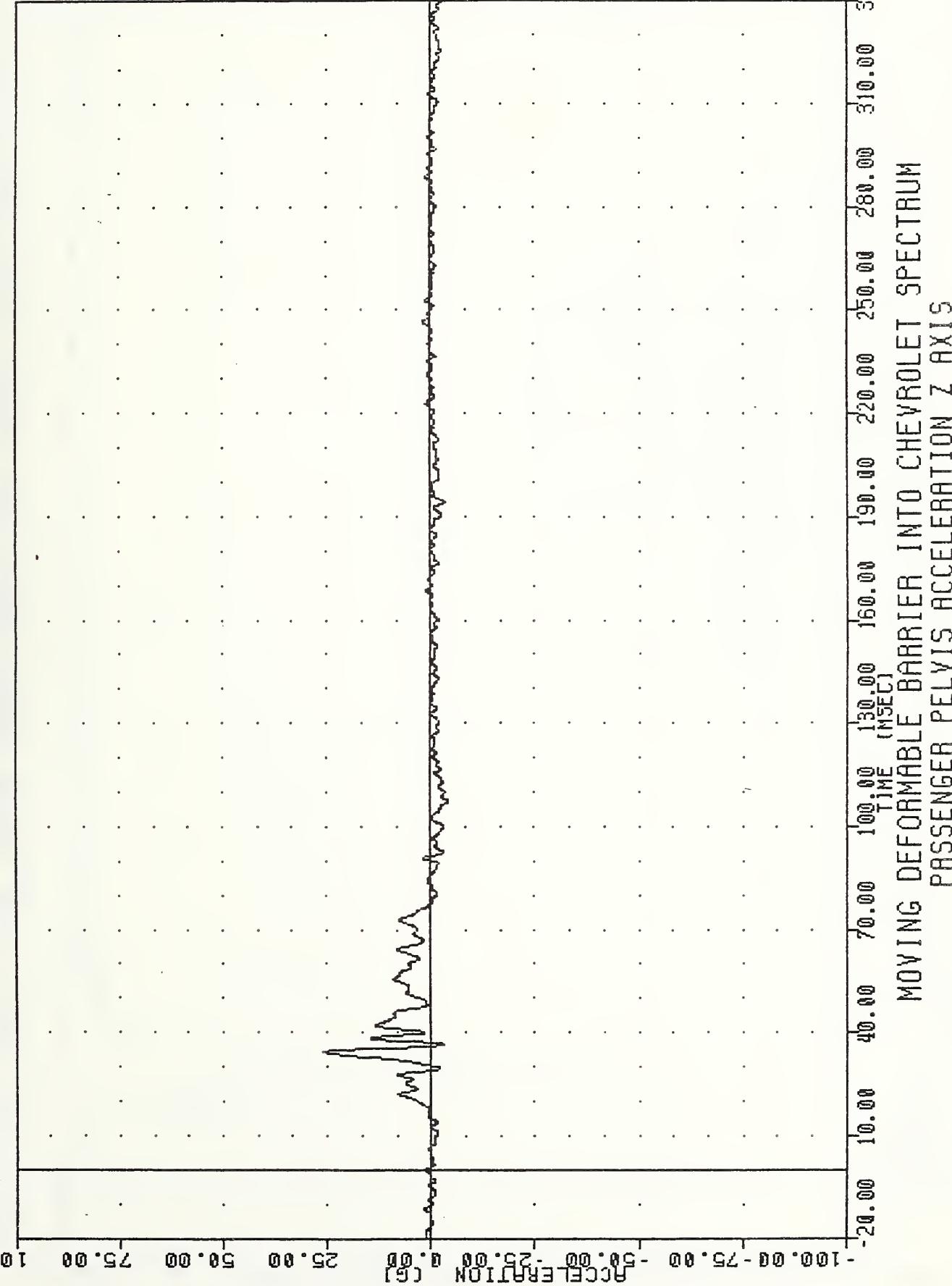
FILTER = BLPF 300/ 949/-40
MIN. MAX VALUES = -4.35@ 143.13 , 102.77 @ 29.25



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
PASSENGER PELVIS ACCELERATION Y AXIS

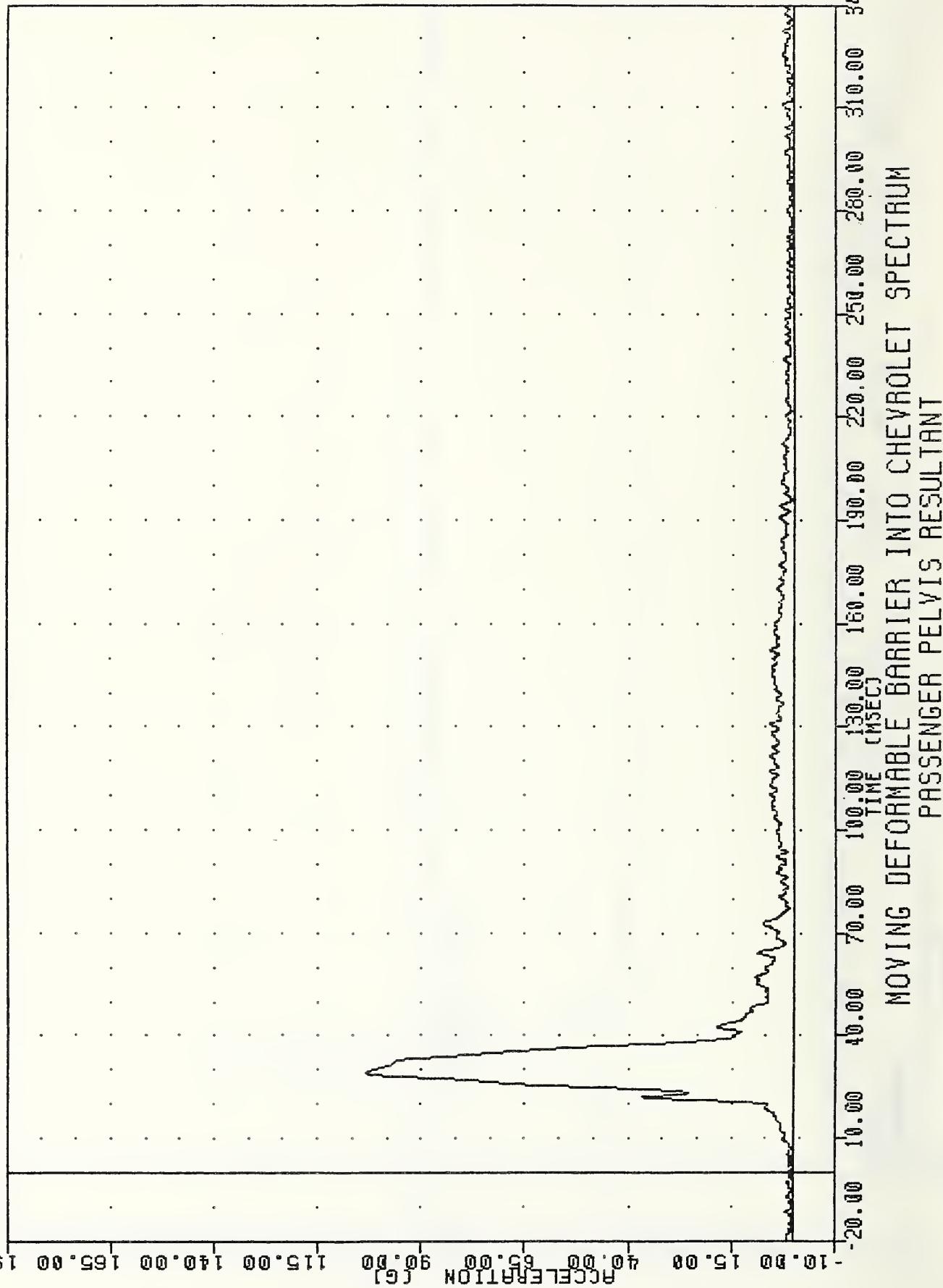
VRT
SI PROTECTION PROD VEHICLE
853360000000
PEVZK4

PLOT DATE 10-DEC-85 09:11:45
FILTER = BLPF 300/ 949/ -40
MIN. MAX VALUES = -4.348 107.25 , 25.92 & 34.25



VRT 851202
SI PROTECTION PROD VEHICLE
8533600000
PEVRG4

PLOT DATE 10-DEC-85 09:11:45
FILTER = BLPF 300/ 949/-40
MIN. MAX VALUES = 0.148 -1.0

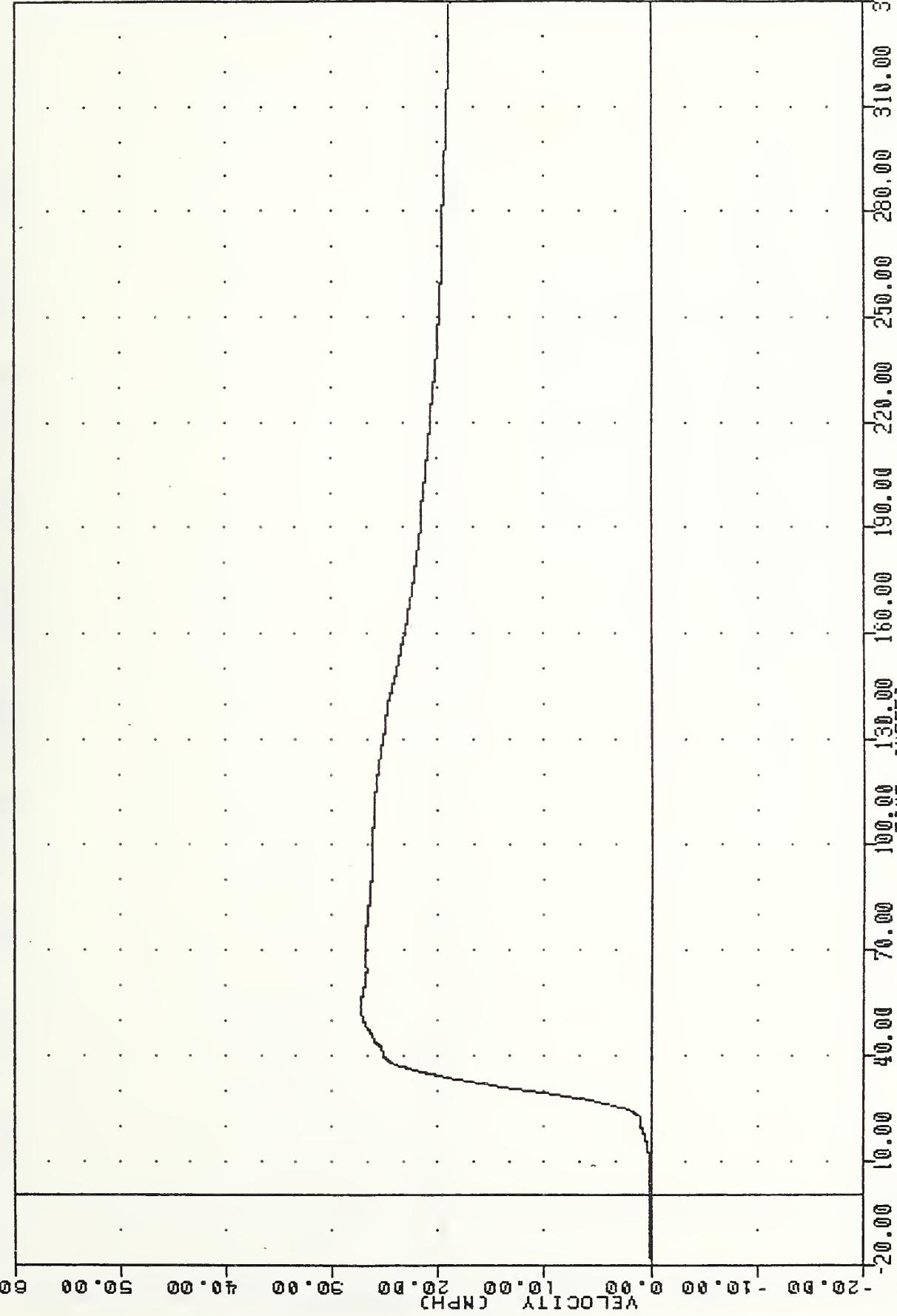


VAT
SI PROTECTION PAD VEHICLE
8533600000
PEVY4

PLOT DATE 10-DEC-85 09:11:45

FILTER = BLPF 300/ 949/-40
MIN. MAX VALUES = 0.00 e -20.00 .

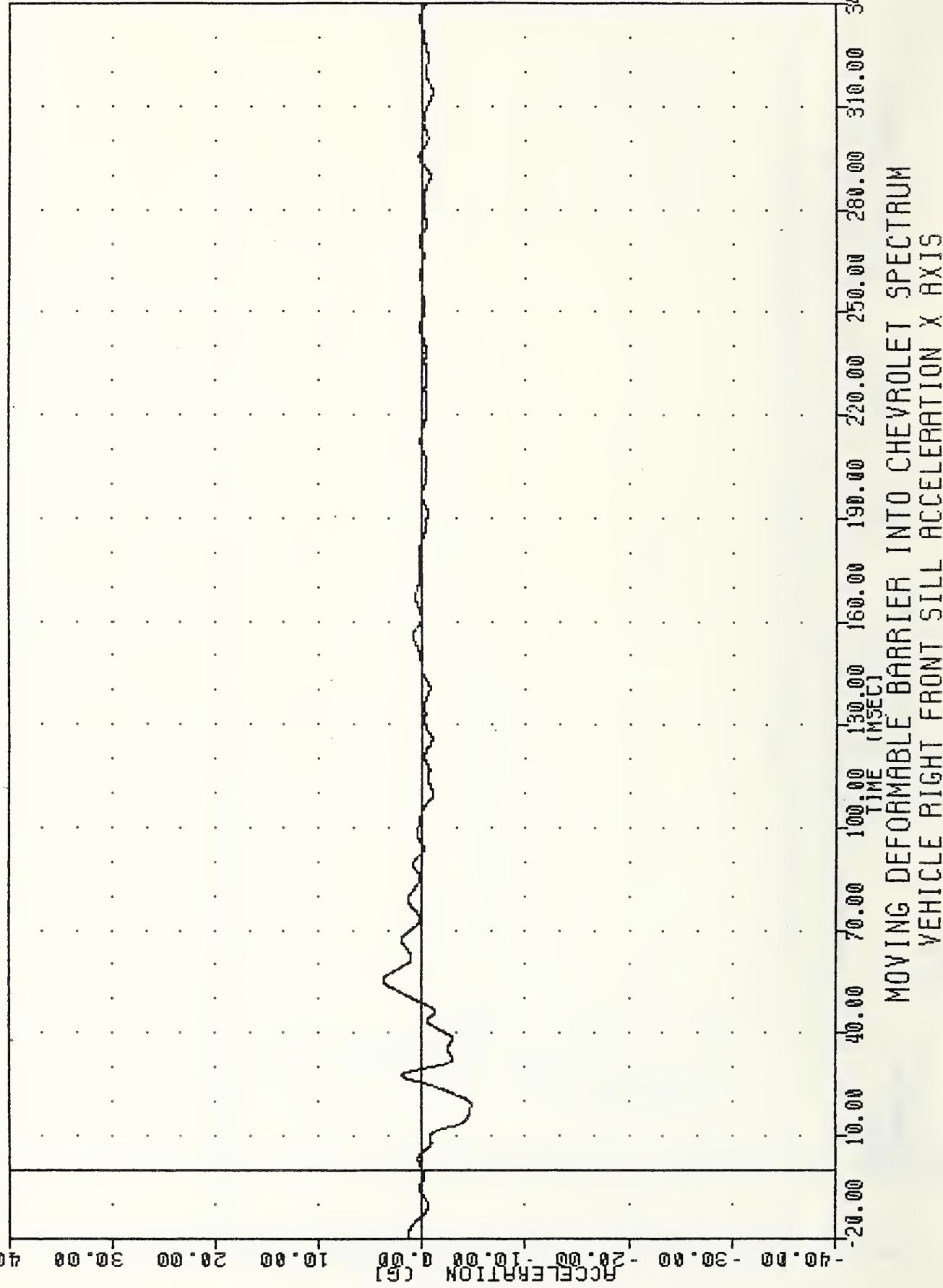
27.25 e 53.75



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING PEVY4

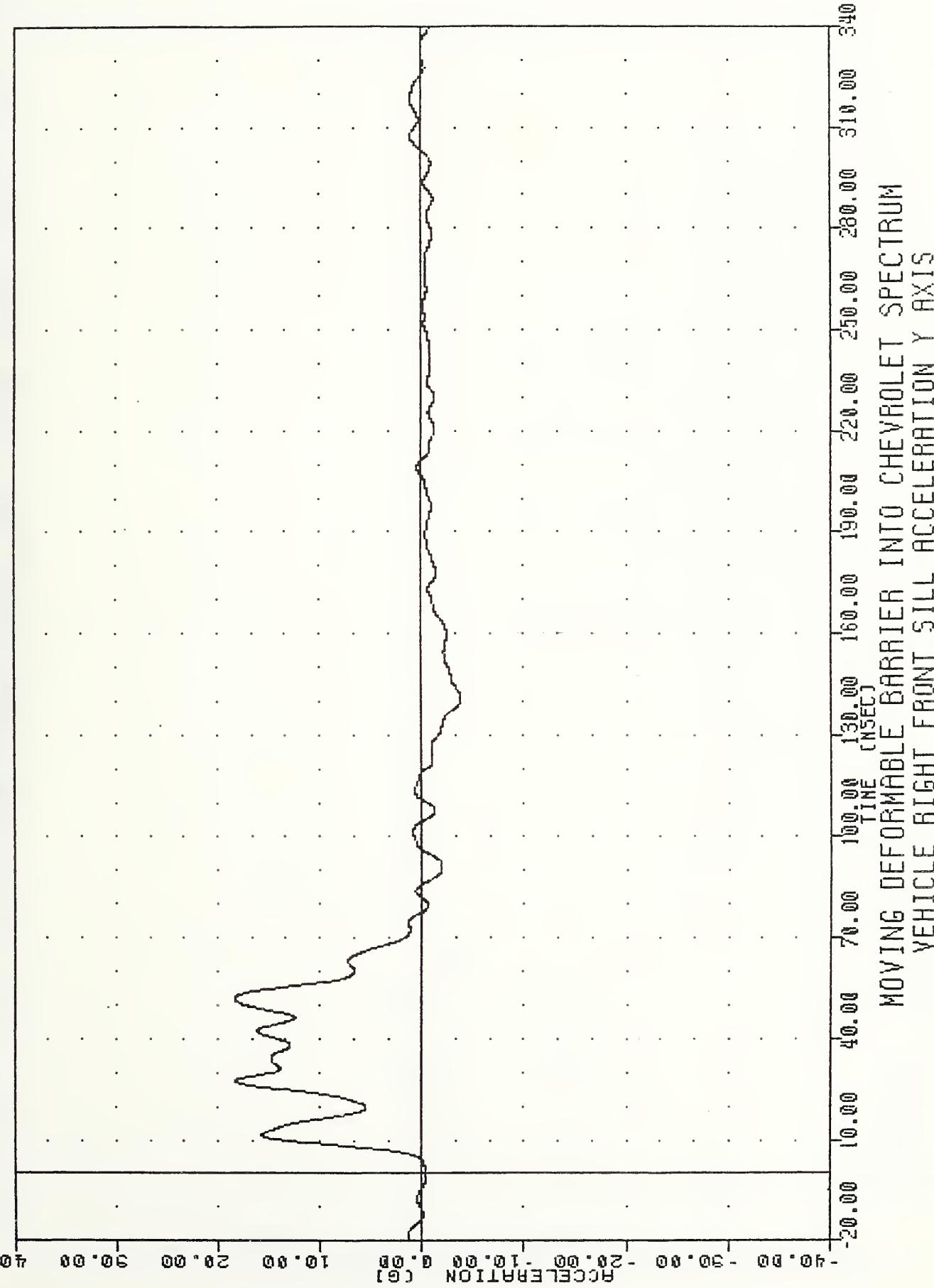
YRT
SI PROTECTION PROD VEHICLE
853360000000
RFSXG

PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPF 100/ 316/-40
MIN, MAX VALUES = -4.778 19.00 , 3.72 & 55.50



VAT
SI PROTECTION PROD VEHICLE
85336000000
RFSY6

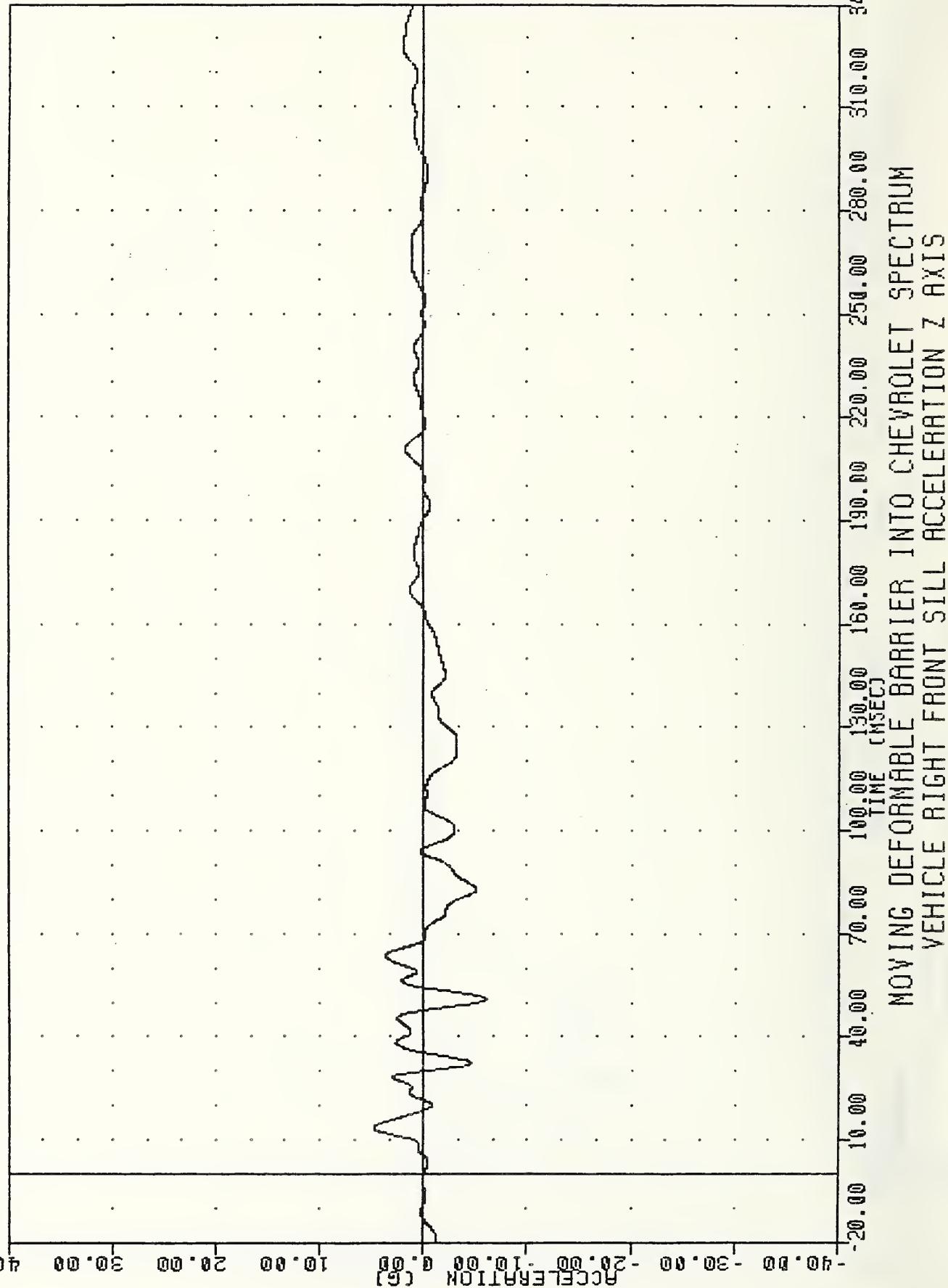
PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPF 100/ 316/-40
MIN. MAX VALUES = -3.86@ 140.50 , 18.39 @ 51.88



TIME [MSEC]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE RIGHT FRONT SILL ACCELERATION Y AXIS

VERT
SI PROTECTION PROD VEHICLE
853360000000
RF SIZG

PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPP 100/ 316/-40
MIN, MAX VALUES = -6.00 & 51.00 , 4.81 & 13.50



VRT
SI PROTECTION PROD VEHICLE
85336000000
AFSRG

PLOT DATE 10-DEC-85 09:43:55

FILTER = BLPF 100/ 316/-40
MIN. MAX VALUES = 0.088 -13.38 . 19.30 & 51.50

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

ACCELERATION [G]

TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE RIGHT FRONT SILL RESULTANT

VRII
SI PROTECTION PROD VEHICLE
853360000000
RFSXV

PLOT DATE 10-DEC-85 09:41:04

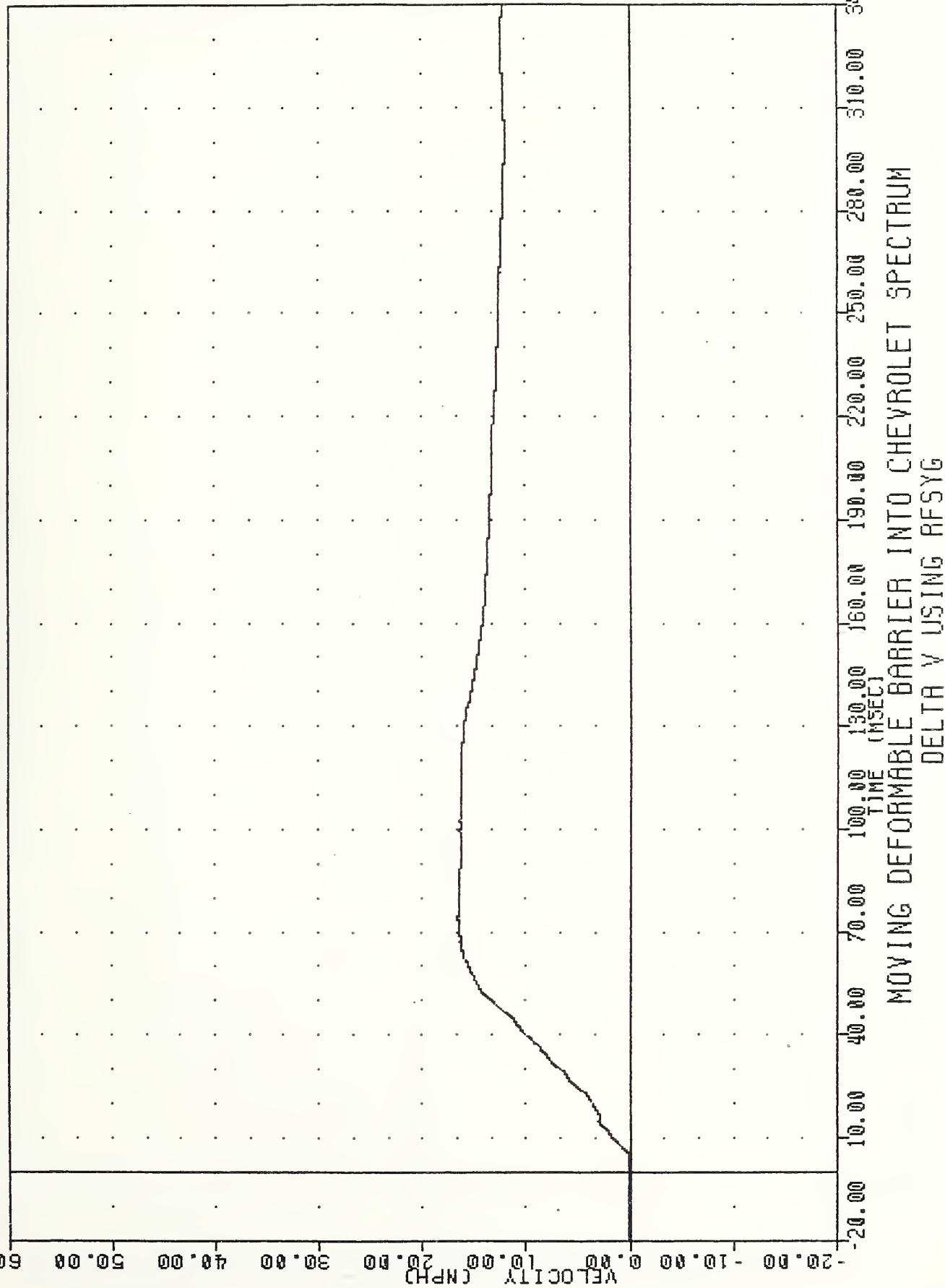
FILTER = BLPP 300/-40
MIN. MAX VALUES = -1.86@ 45.63 , 0.06@ -17.63

VELOCITY 10.00 MPH

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING RFSXG

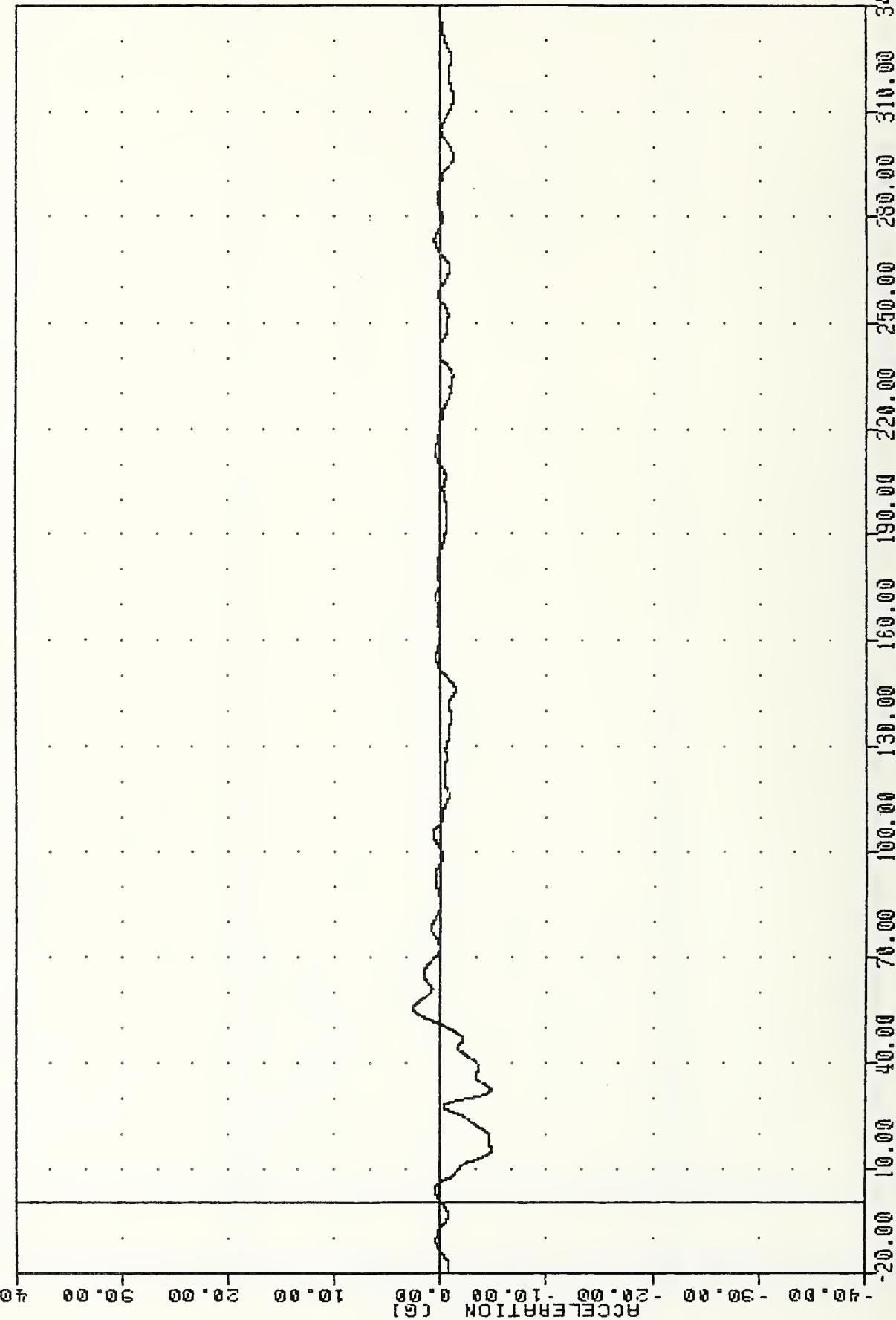
VRT , 851202
SI PROTECTION PROD VEHICLE
853360000000
RFSYV

PLOT DATE 10-DEC-85 @ 09:41:04
FILTER = BLPF 300/
MIN. MAX VALUES = 0.000 -20.00 , 16.57 & 74.00



VAT , 851202
SI PROTECTION PAD VEHICLE
85336000000
RRSX6

PLT DATE 10-DEC-85 09:41:04
FILTER = BLPF 100/ 316/-40
MIN, MAX VALUES = -4.798 15.25 , 2.61 8 55.63



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE RIGHT REAR SILL ACCELERATION X AXIS

YRT , 851202
SI PROTECTION PROD VEHICLE
85336000000.
RRSYG

PLOT DATE 10-DEC-85 @9:41:04
FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = -4.328 132.25 , 24.09 & 51.00

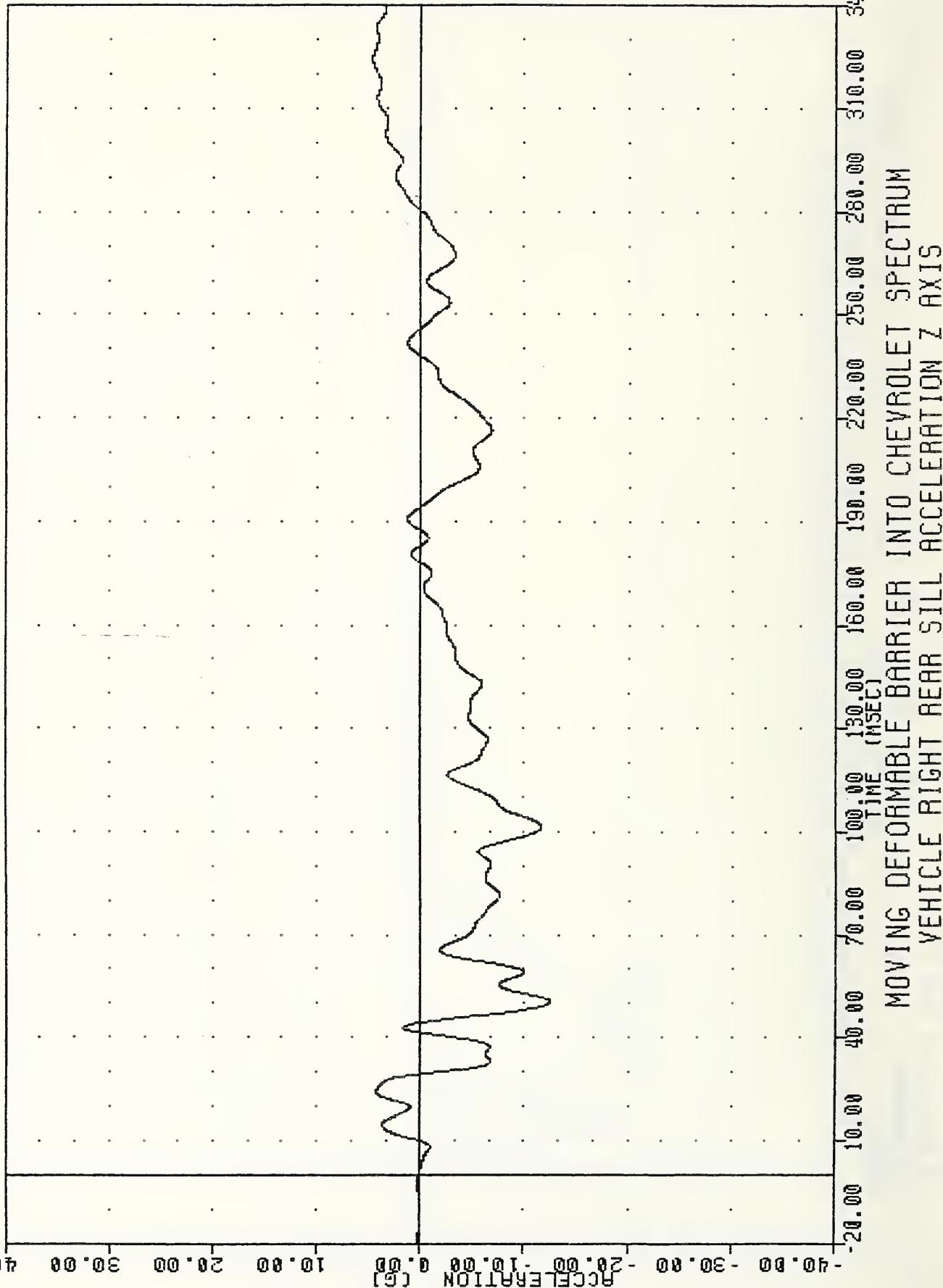
-40.00 -30.00 -20.00 -10.00 10.00 20.00 30.00 40.00
ACCELERATION (G)

B-77

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE RIGHT REAR SILL ACCELERATION Y AXIS

VRT 851202
SI PROTECTION PROD VEHICLE
853360000000
ARSZG

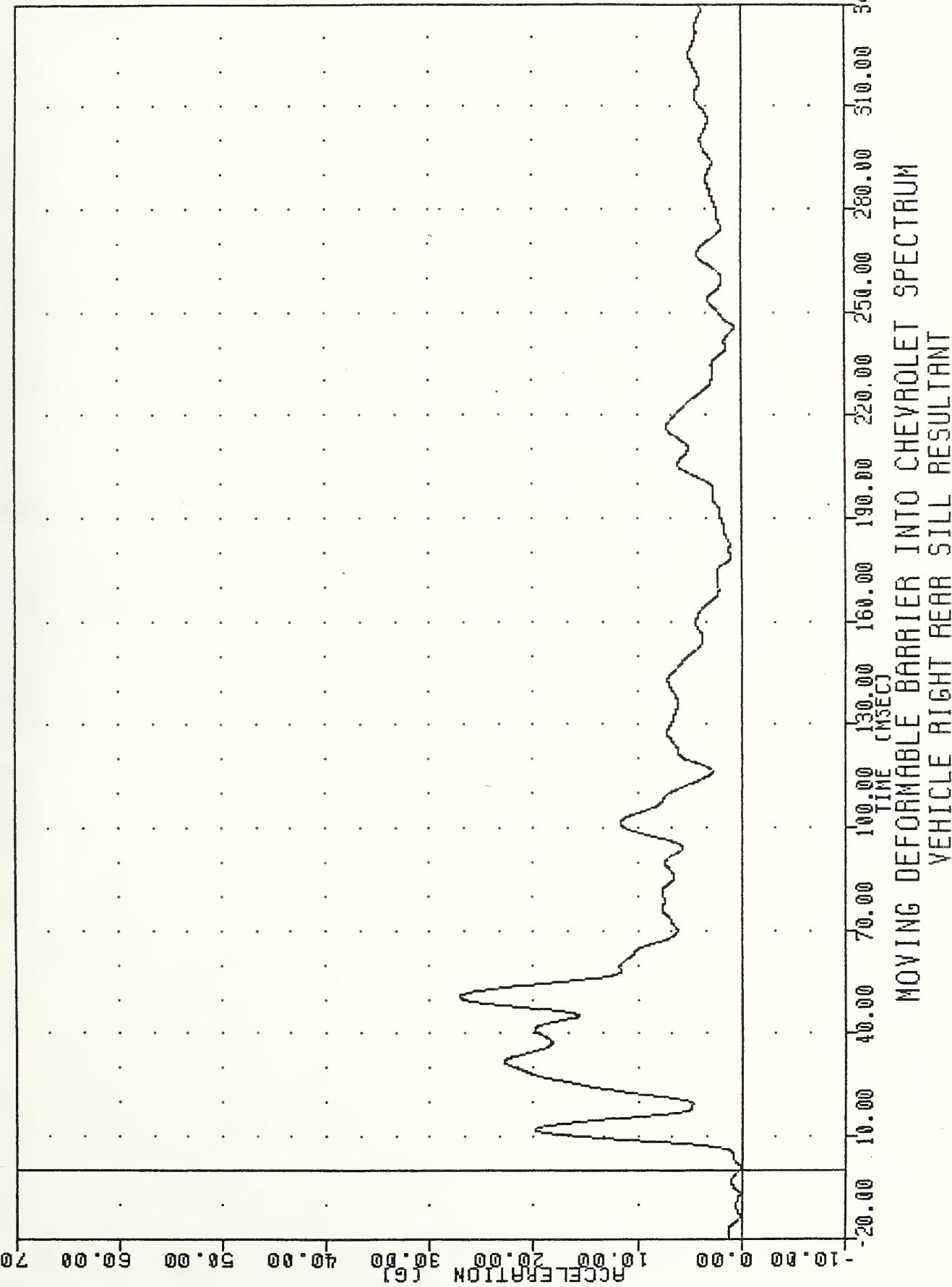
PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPP 100/ 316/ -40
MIN, MAX VALUES = -12.50 & 50.63 , 4.66 & 324.38



VRT
SI PROTECTION PROD VEHICLE
8533600000
RRSRG

PLOT DATE 10-DEC-85 09:43:55

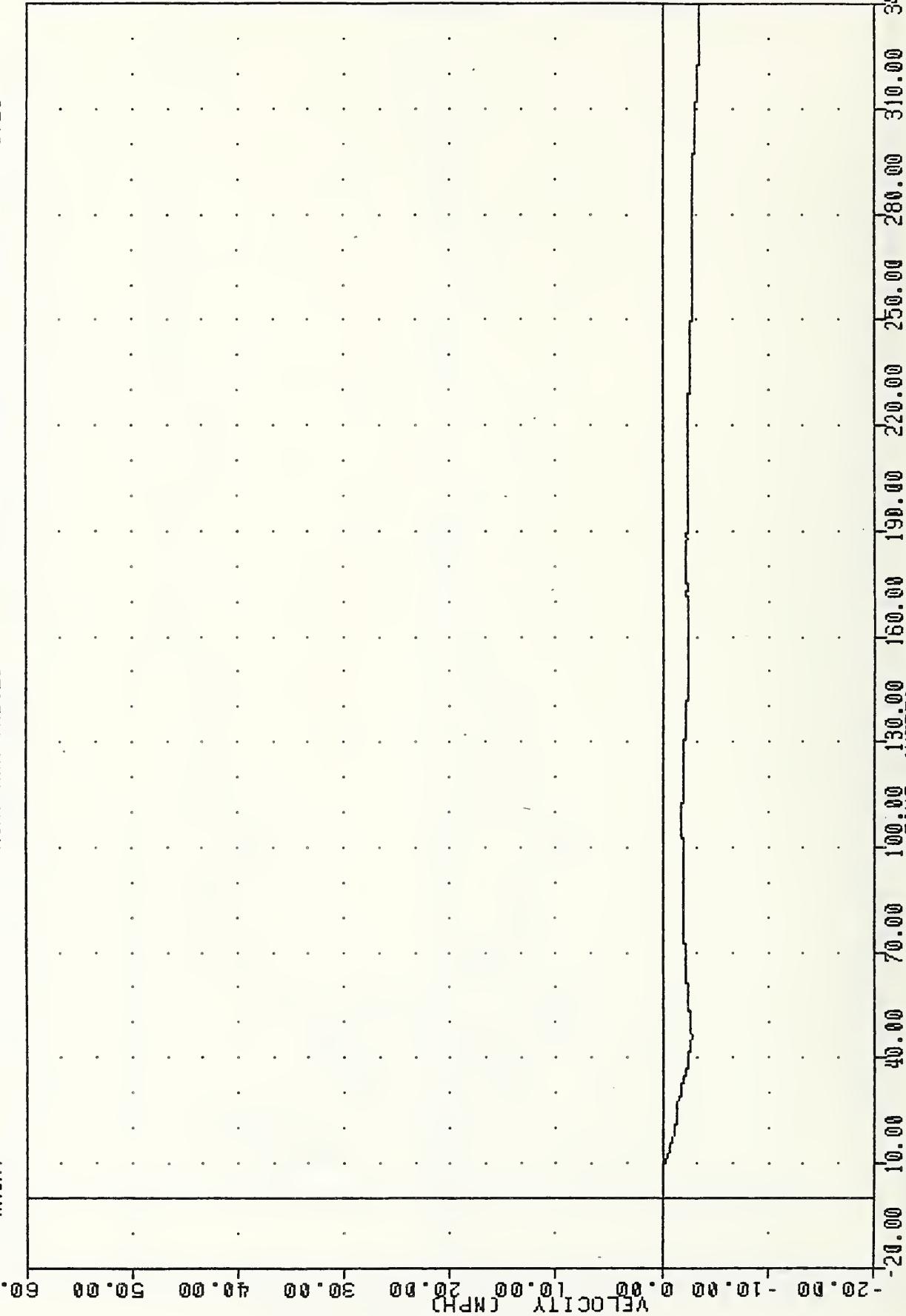
FILTER = BLPF 100/ 316/ -40
MIN. MAX VALUES = 0.088 0.63 27.11 8 50.88



VAT
SI PROTECTION PROD VEHICLE
853360000000
RRSXV

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 300/
MIN, MAX VALUES = -3.488 340.00 ,
0.01 8 -8.25



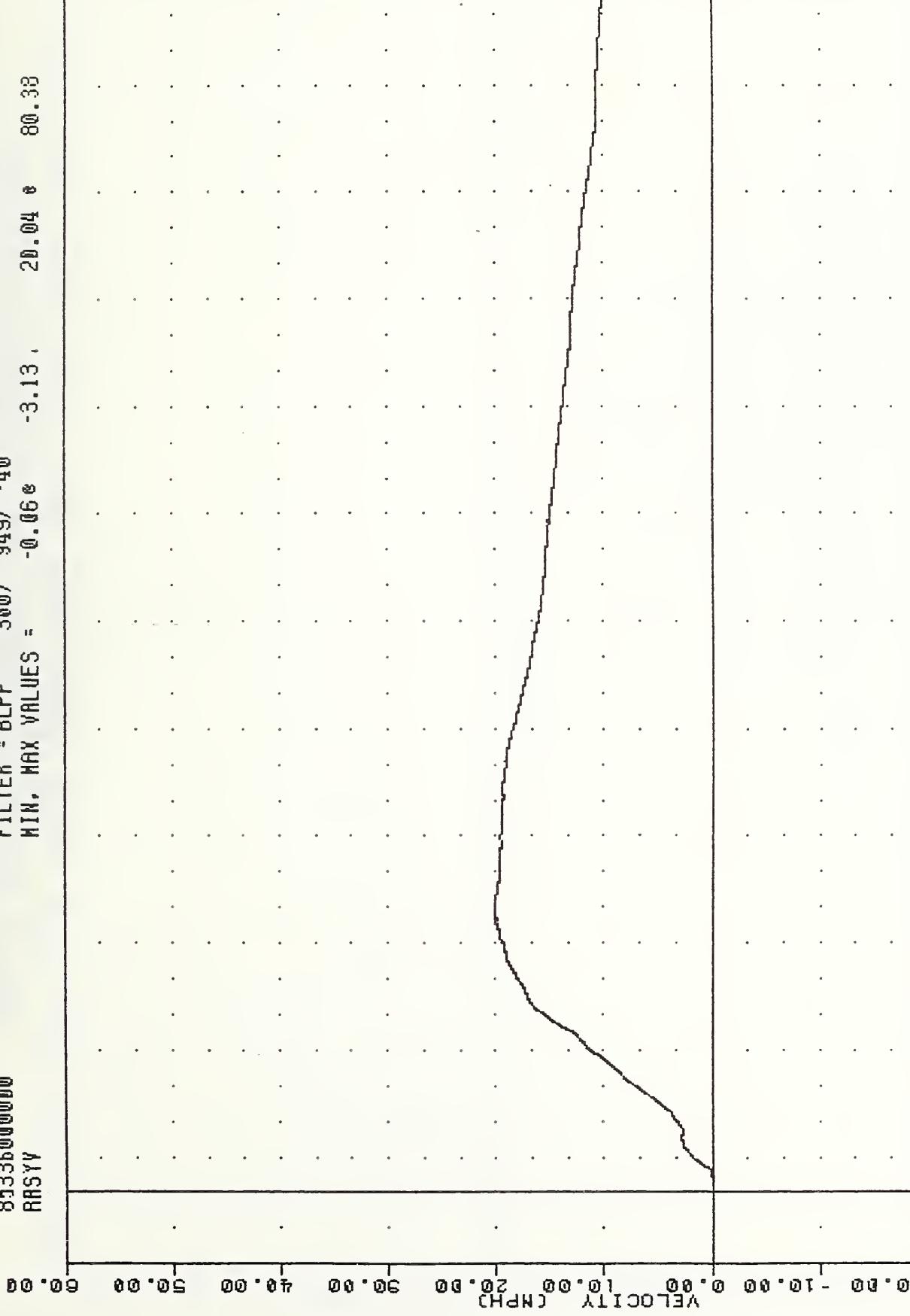
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING RRSXG

VAT , 8512@2
SI PROTECTION PAD VEHICLE
853360@00000
RASYY

PLT DATE 10-DEC-85 09:41:04

FILTER = BLPP 300/ 949/-40
MIN, MAX VALUES = -0.068 -3.13 , 20.04 & 80.38

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME [NSEC]

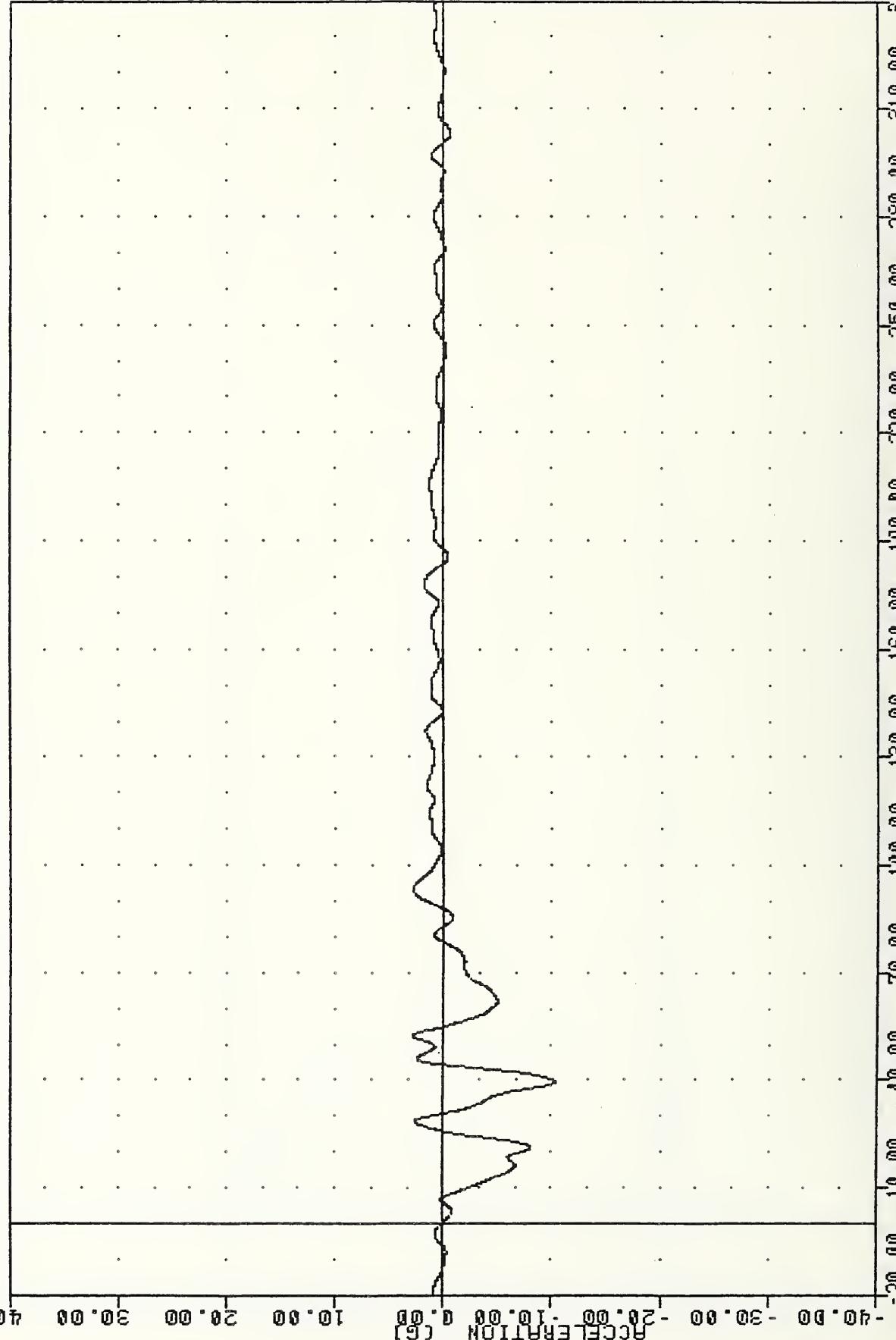


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING RRSYG

VRT
SI PROTECTION PROD VEHICLE
85336000000
RDKXG

PLOT DATE 10-DEC-85 09:41:04

FILTER = 6LPF 100/ 316/-40
MIN. MAX VALUES = -10.28 & 39.50 , 2.91 & 52.50



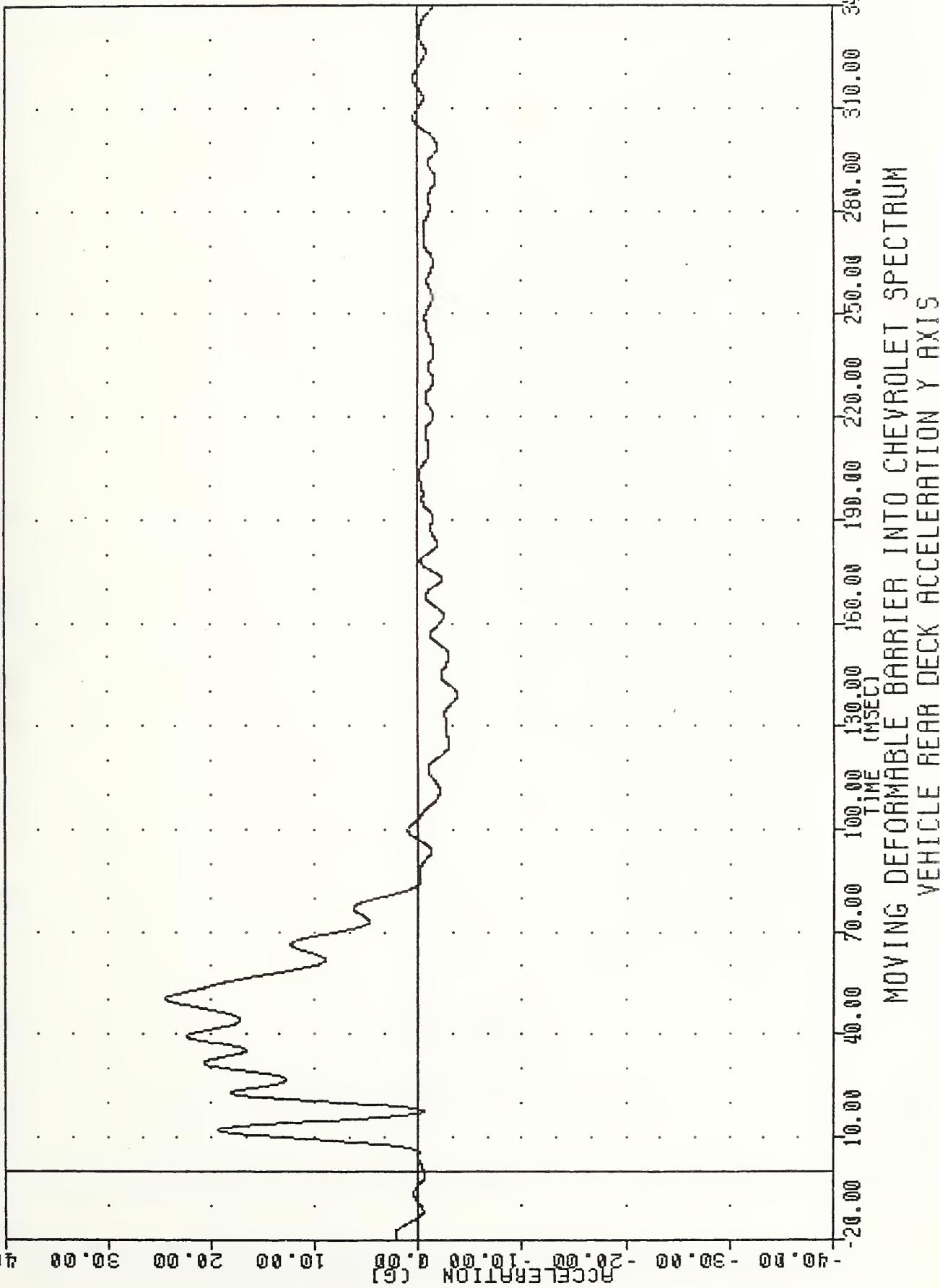
TIME [MSEC]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE REAR DECK ACCELERATION X AXIS

VRT 851202
SI PROTECTION PROD VEHICLE
8533600000
ADKYG

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 100/-316/-40

MIN. MAX VALUES = -3.768 139.38 . 24.47 & 50.50



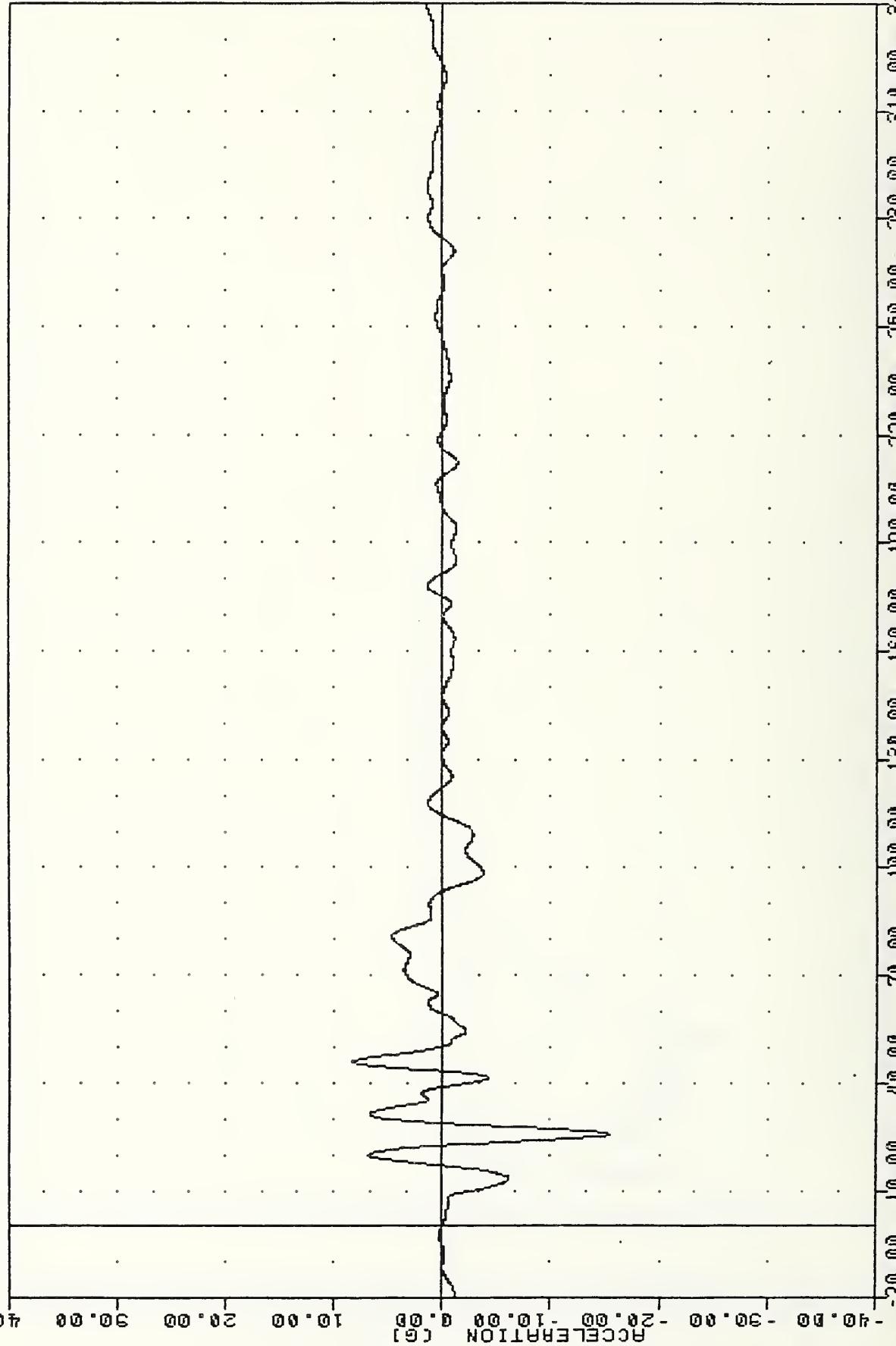
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE REAR DECK ACCELERATION Y AXIS

VAT , 851202
SI PROTECTION PAD VEHICLE
85336000000
R0KZ6

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 100 / 316/-40
MIN, MAX VALUES = -15.40 & 25.75 ,

8.31 & 45.88

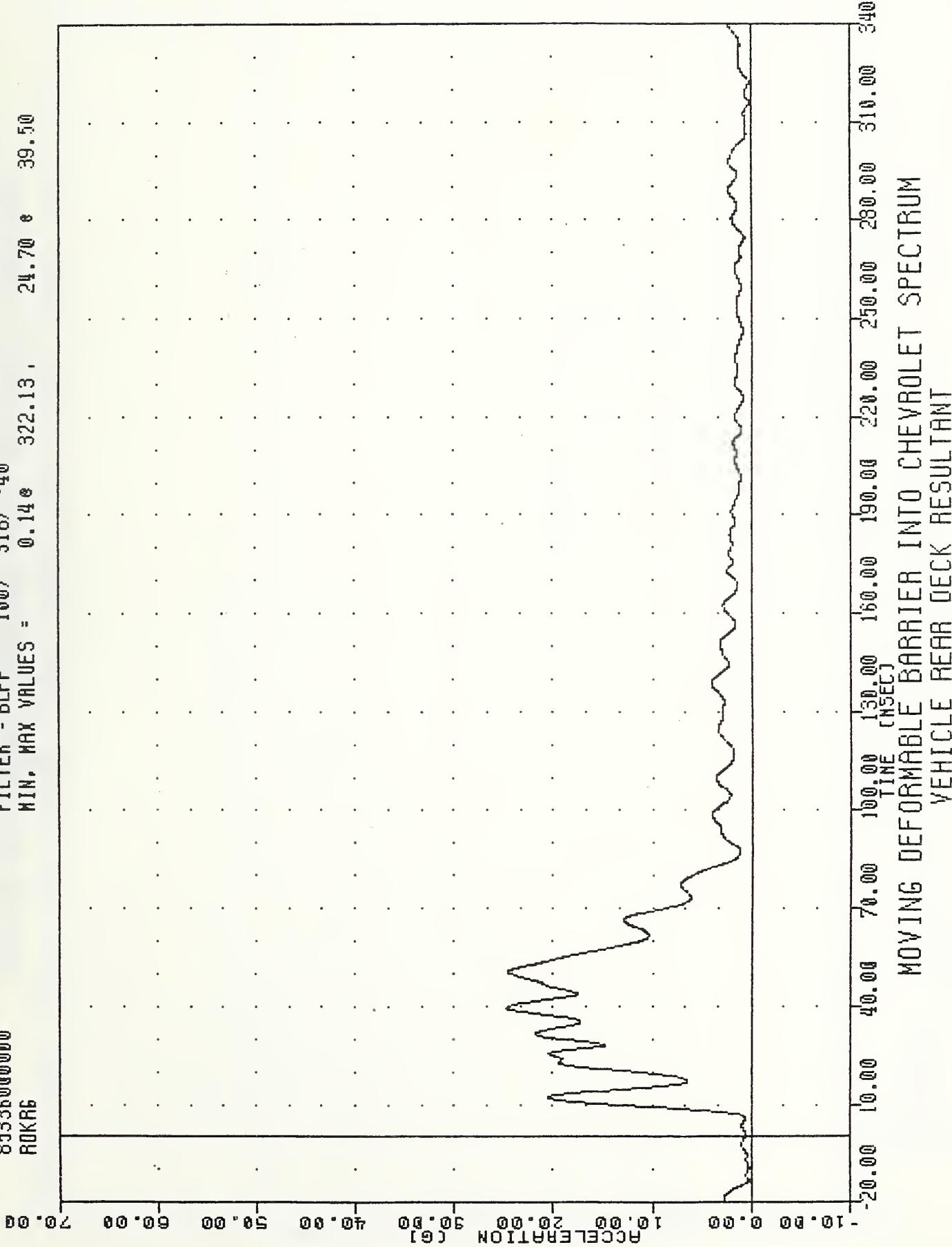


VAT , 851202
SI PROTECTION PROD VEHICLE
853360000000
ROKRG

PLOT DATE 10-DEC-85 09:43:55

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = 0.14@ 322.13 . 24.7@ 6 39.5@

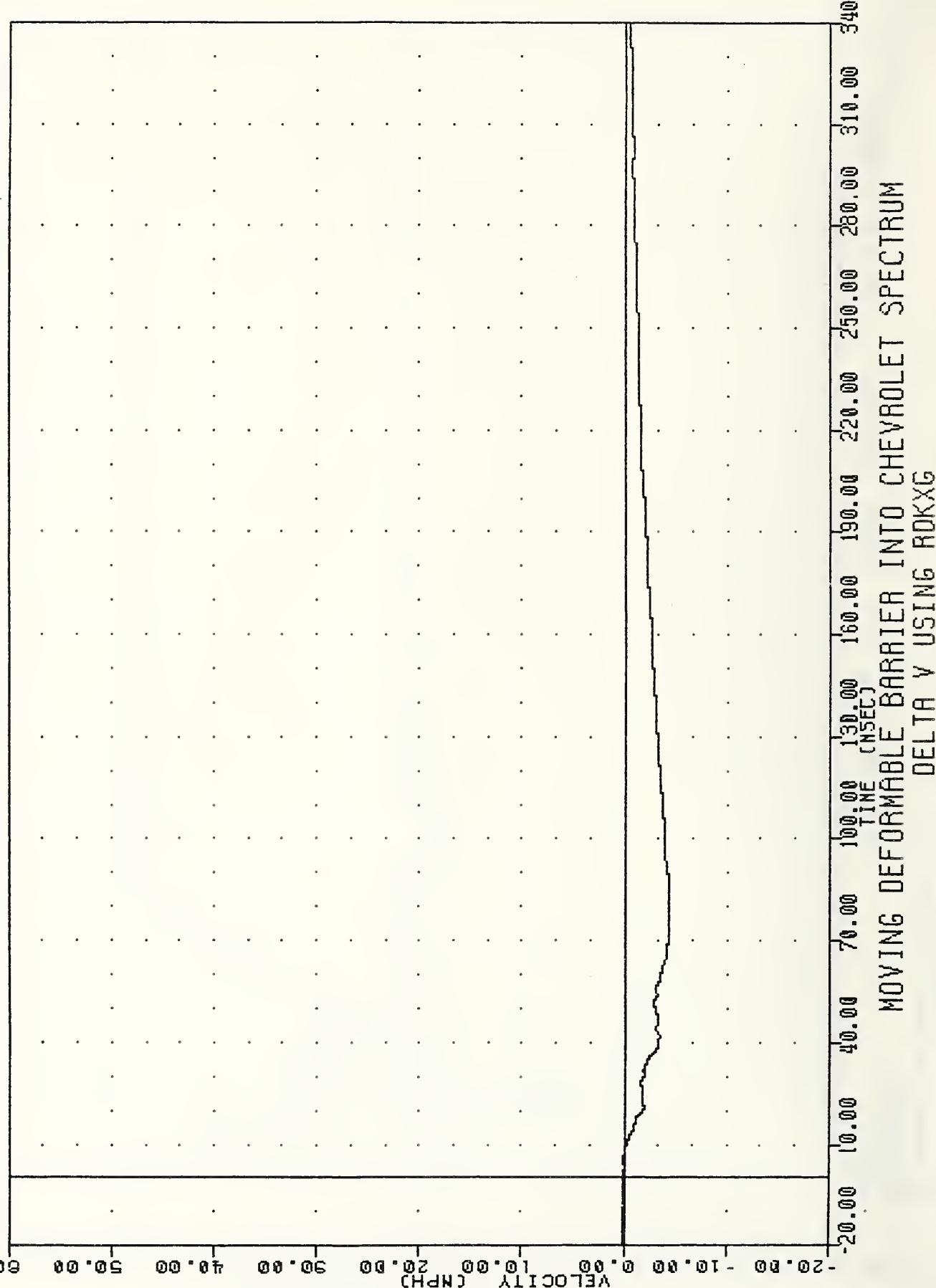
-10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00



TIME (msec)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE REAR DECK RESULTANT

VAT
SI PROTECTION PROD VEHICLE
853360000000
ROKXY

PLT DATE 10-DEC-85 09:41:04
FILTER = BLPF 300 / 949/-40
MIN, MAX VALUES = -4.43@ 85.00 ,
0.10 @ 5.63



VRT
SI PROTECTION PROD VEHICLE
85336000000
RDKYV

PLOT DATE 10-DEC-85 @9:41:04

FILTER = BLPF 300/ 949/-40
MIN. MAX VALUES = -0.028 5.38 , 22.00 & 85.63

0.00

50.00

40.00

30.00

20.00

10.00

0.00

0.00

10.00 (MPH)

20.00

30.00

40.00

50.00

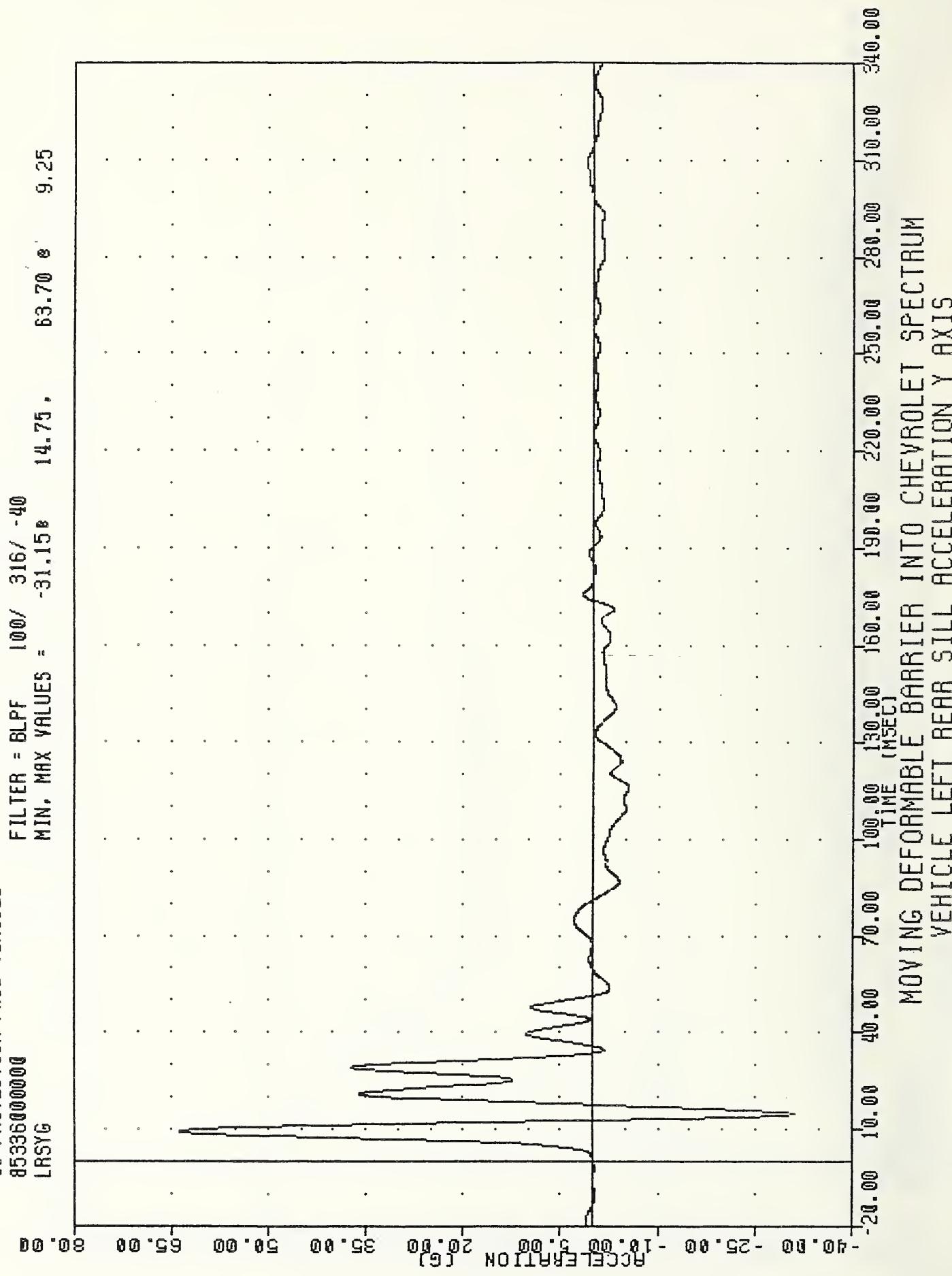
60.00

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING RDKY6

VRT
SI PROTECTION PROD VEHICLE
85336000000
LRSYG

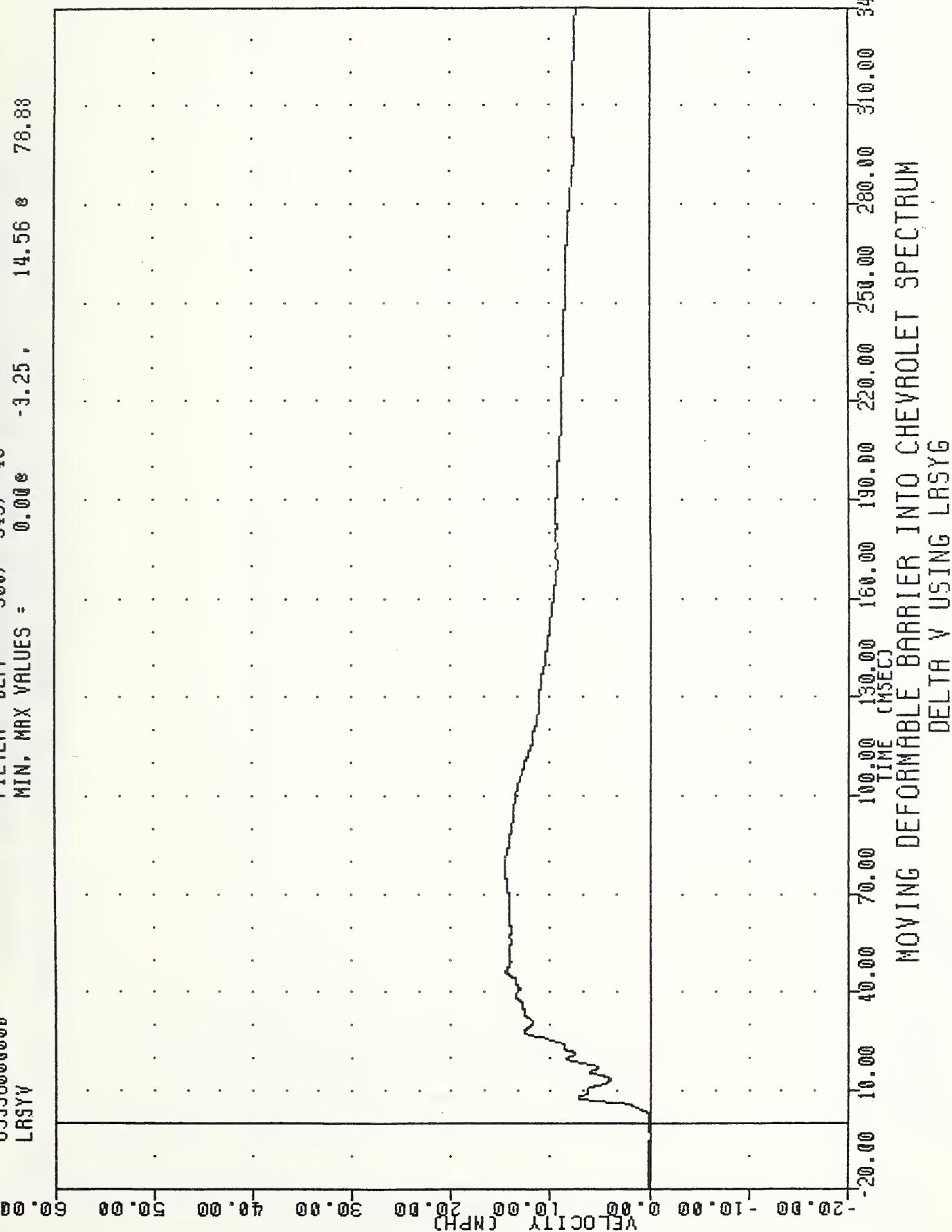
PLOT DATE 10-DEC-85 09:41:04



VRT
SI PROTECTION PROV VEHICLE
853360@00000
LRSYV

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 300/ 949/-40
MIN, MAX VALUES = 0.00 @ -3.25 , 14.56 @ 76.88

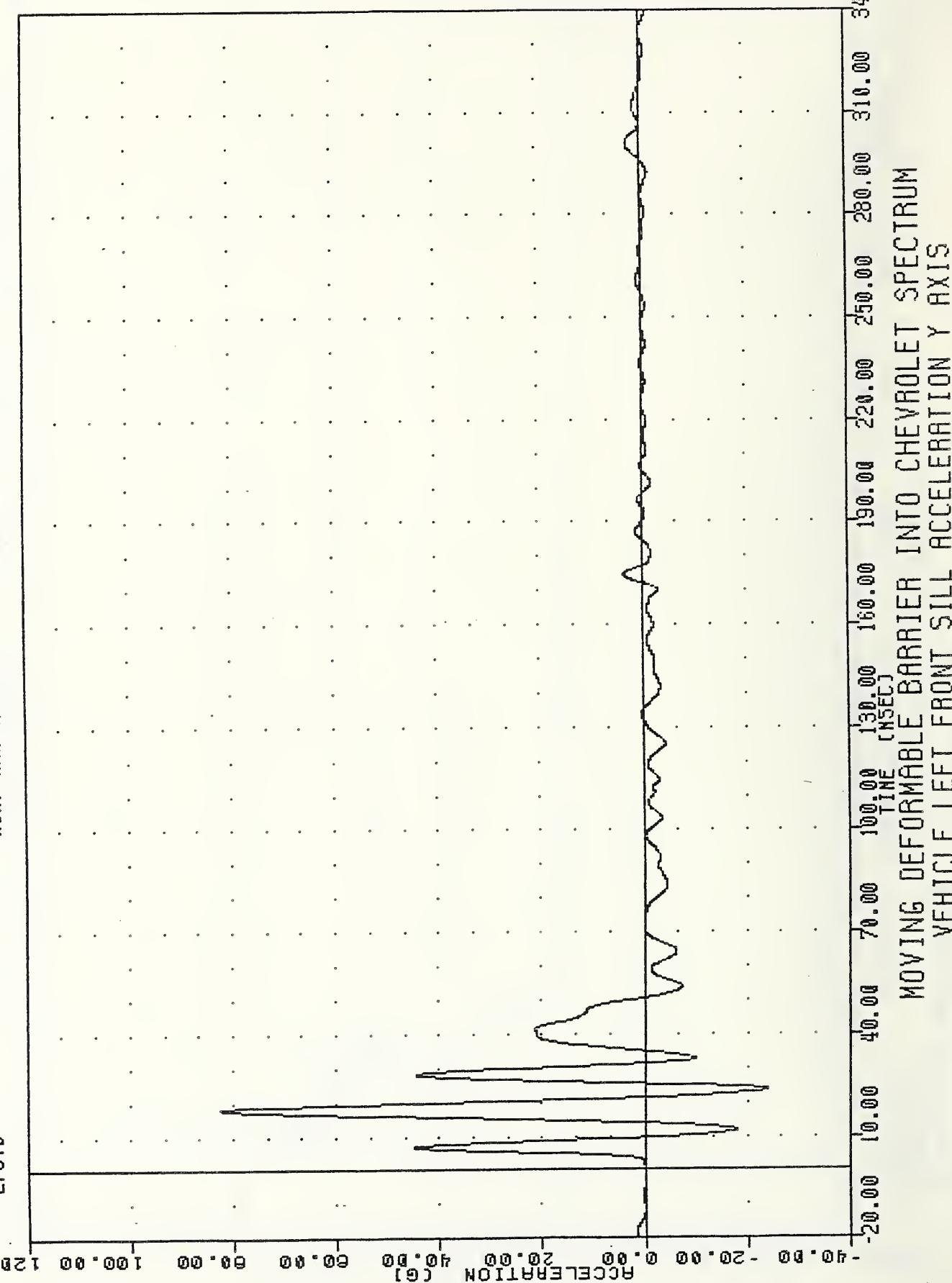


VAT , 851202
SI PROTECTION PROD VEHICLE
853360000000
LFSY6

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -24.05 & 23.75 , 82.33 & 18.00

ACCELERATION [G] -40.00 -20.00 0.00 20.00 40.00 60.00 80.00 100.00 120.00



VRT
SI PROTECTION PROD VEHICLE
85336000000
LFSYV

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 3000/ 949/-40
MIN, MAX VALUES = 0.000 -20.00 , 16.19 & 47.63

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

VELOCITY

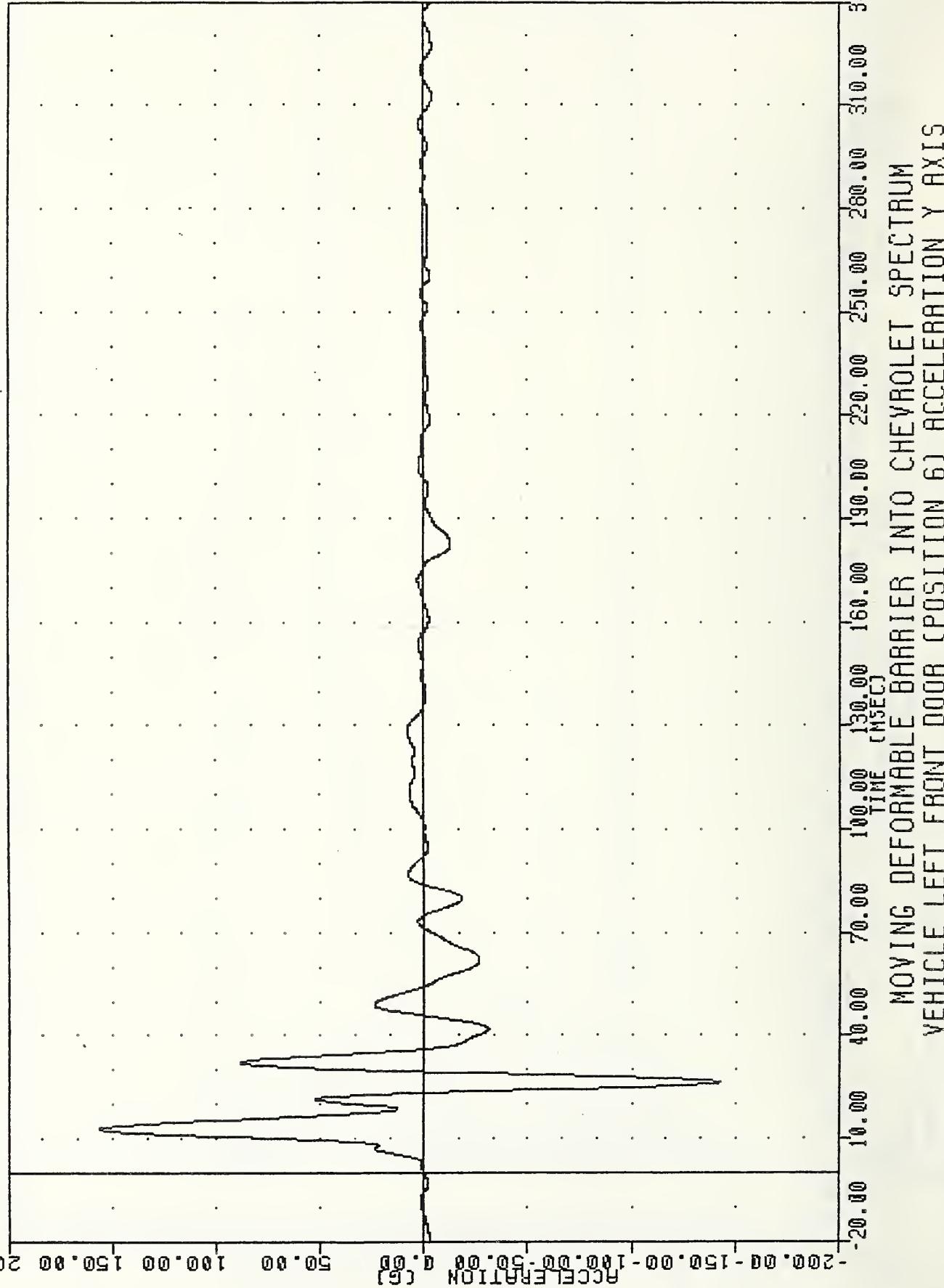
10.00 (MPH)

MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING LFSYV

VRI
SI PROTECTION PROV VEHICLE
85336000000
LFDYGI

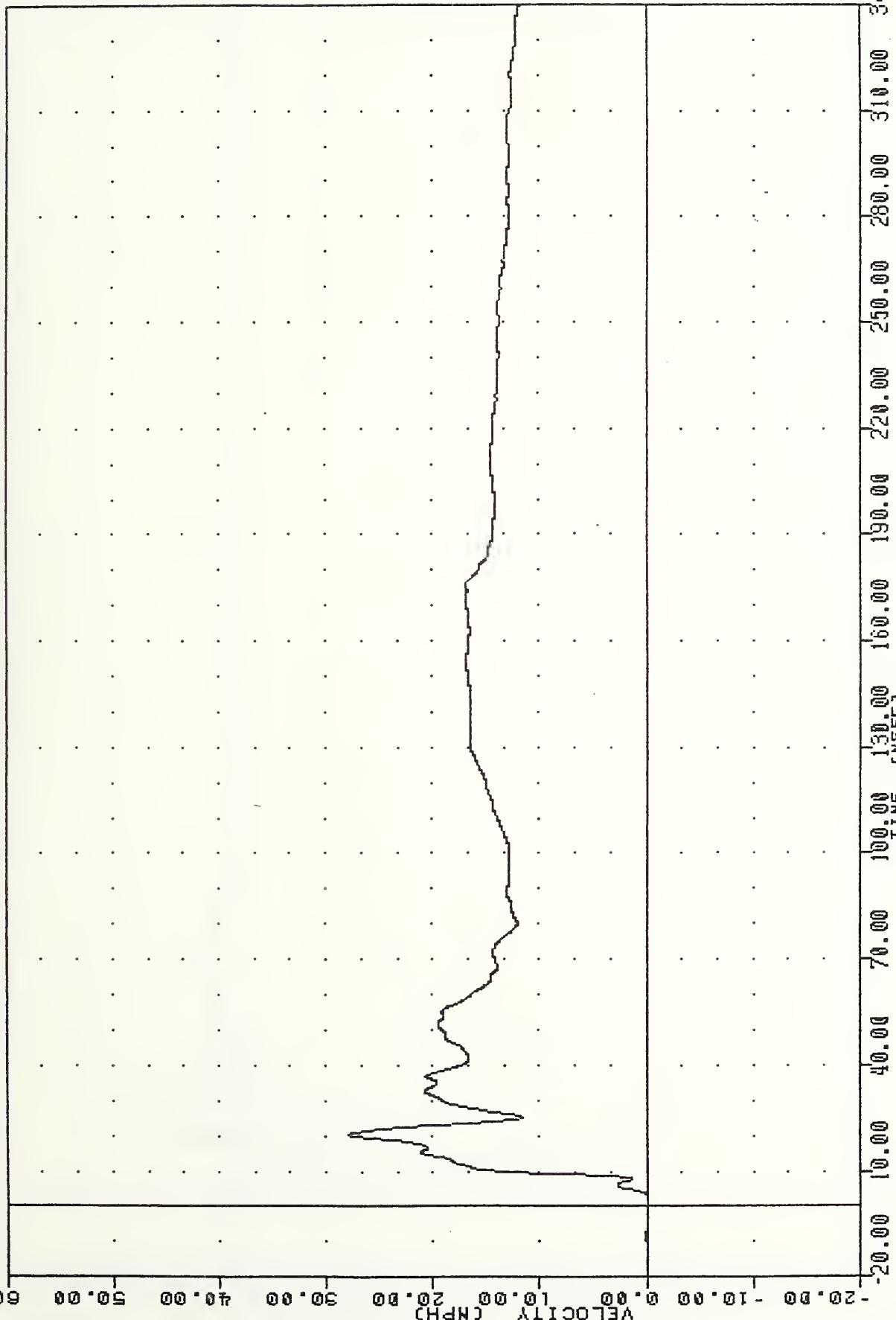
PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPP 100/-316/-40
MIN. MAX VALUES = -143.25@ 26.38 , 156.68 @ 12.88



VAT , 851202
SI PROTECTION PROD VEHICLE
85336000000
LFDYV1

PLT DATE 10-DEC-85 09:41:04
FILTER = BLPP 300 / 949/-40
MIN. MAX VALUES = -0.15@ -5.25 , 27.89 @ 20.38

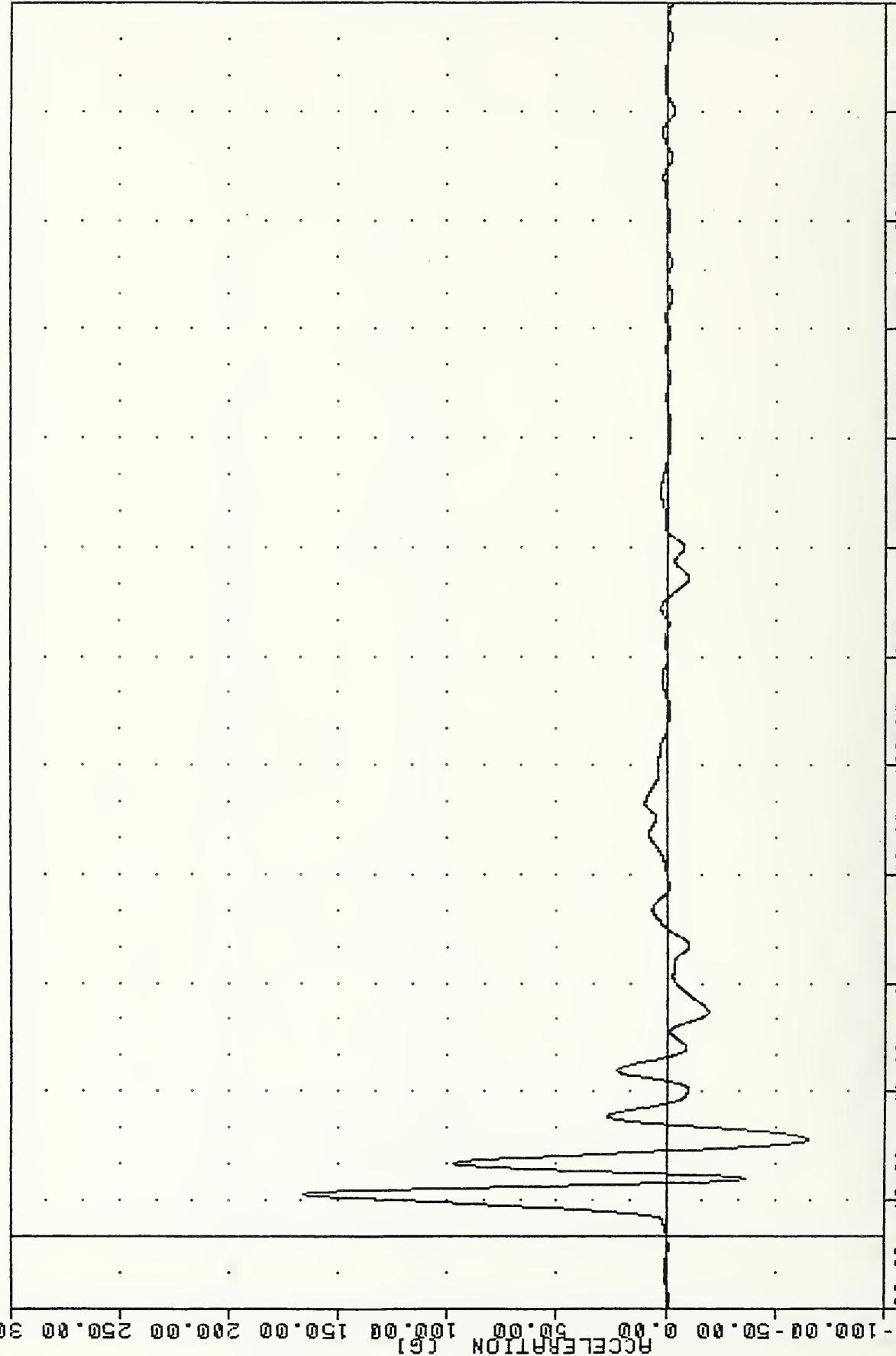


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA Y USING LFDYV1

YRT
SI PROTECTION PROD VEHICLE
85336000000
LFDY62

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 100/ 316/-40
MIN, MAX VALUES = -65.10@ 26.63 , 166.01 @ 11.5@



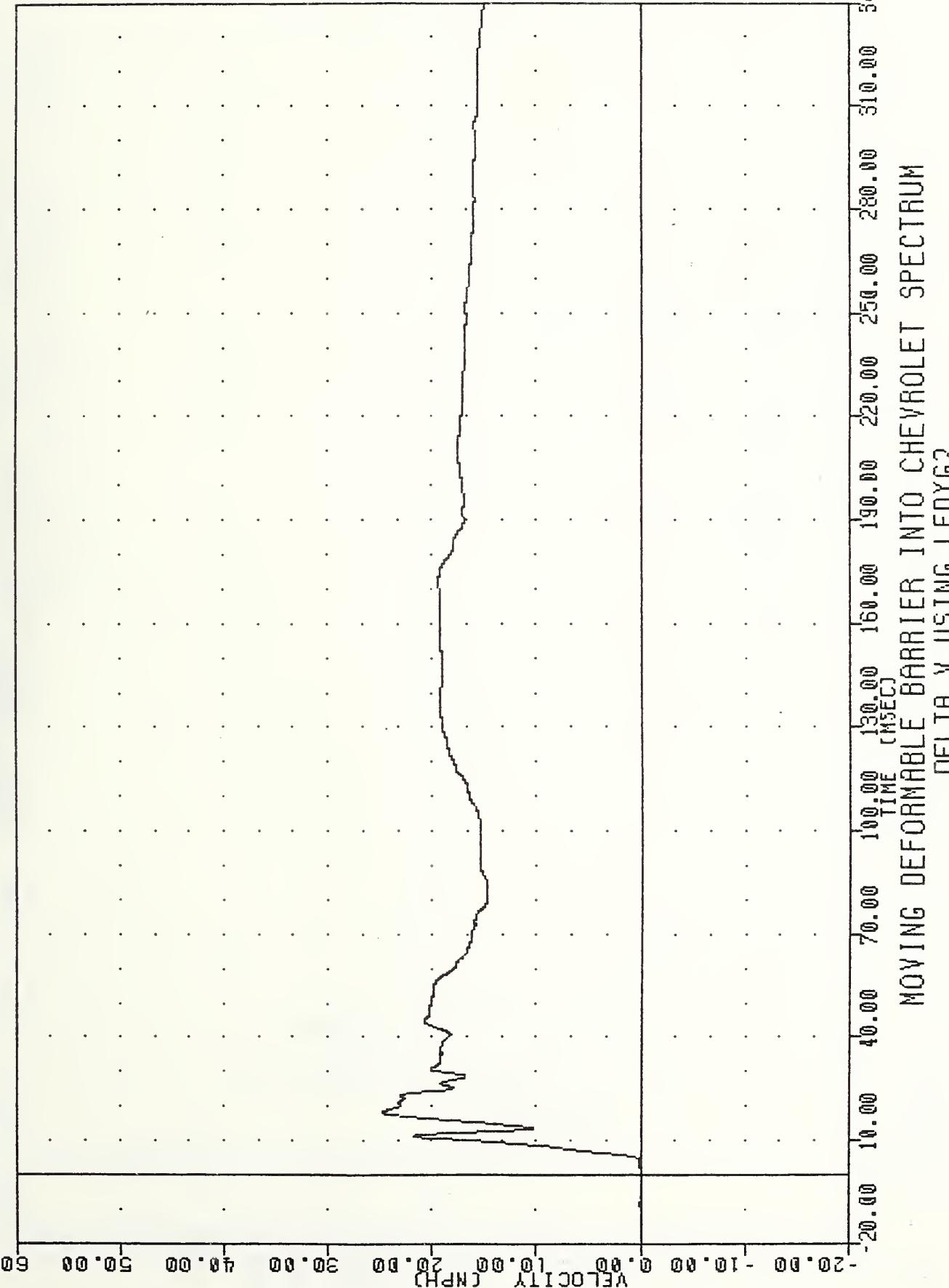
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME (MSEC)
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE LEFT FRONT DOOR (POSITION 8) ACCELERATION Y AXIS

VRI , 851202-
SI PROTECTION PROD VEHICLE
85336000000
LFDY62

PLOT DATE 10-DEC-85 09:41:04

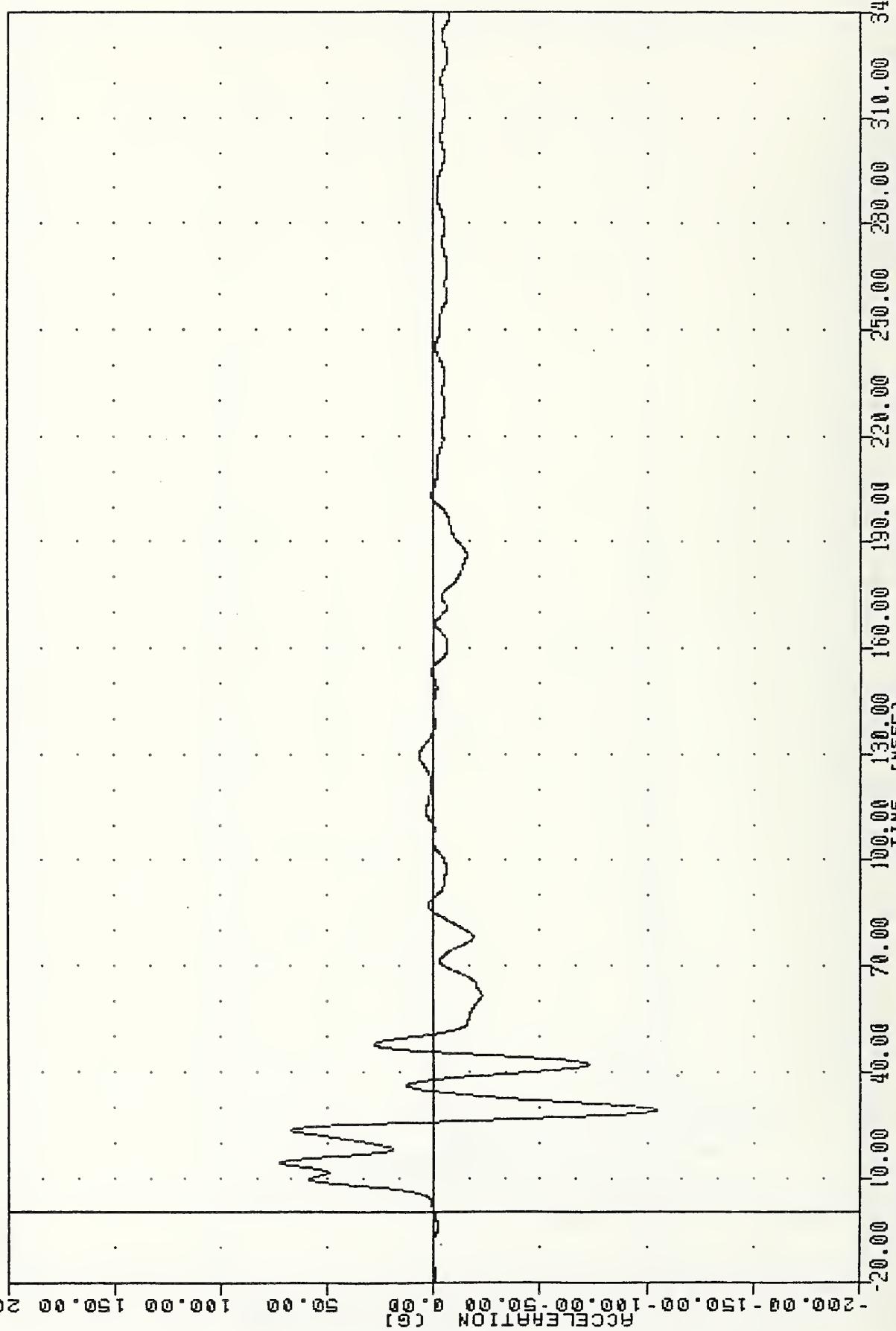
FILTER = BLPF 300/ 949/-40
MIN, MAX VALUES = -0.098 -2.25 , 24.69 & 18.13

00



VAT
SI PROTECTION PROD VEHICLE
853360000000
LFDY63

PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPF 100 / 316/-40
MIN. MAX VALUES = -104.778 29.13 , 72.08 & 14.25

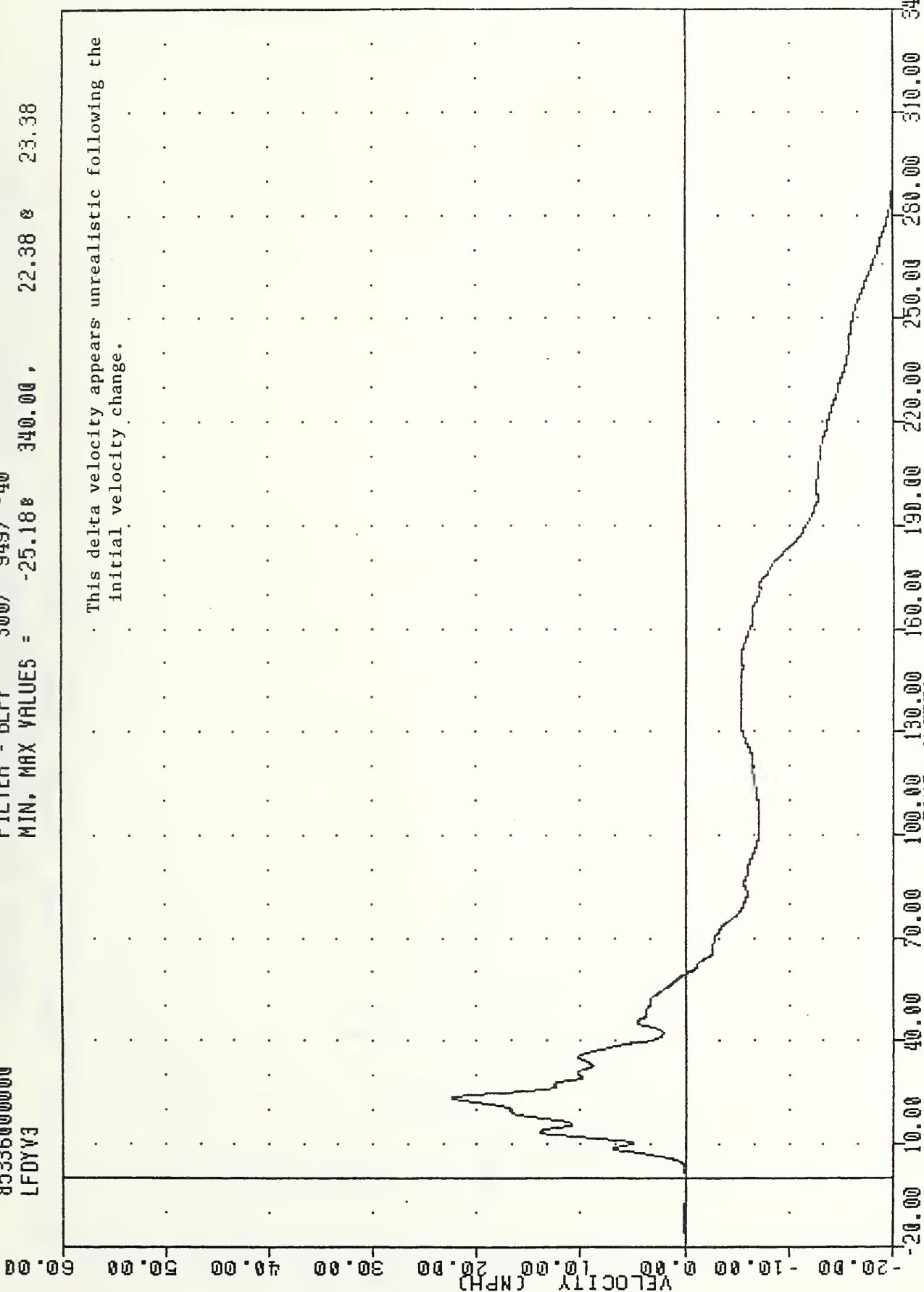


MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
VEHICLE LEFT FRONT DOOR (POSITION 9) ACCELERATION Y AXIS

YRT
SI PROTECTION PROD VEHICLE
85336000000
LFDYV3

PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPF 3000/ 949/-40
MIN. MAX VALUES = -25.188 340.00 , 22.38 8 23.38

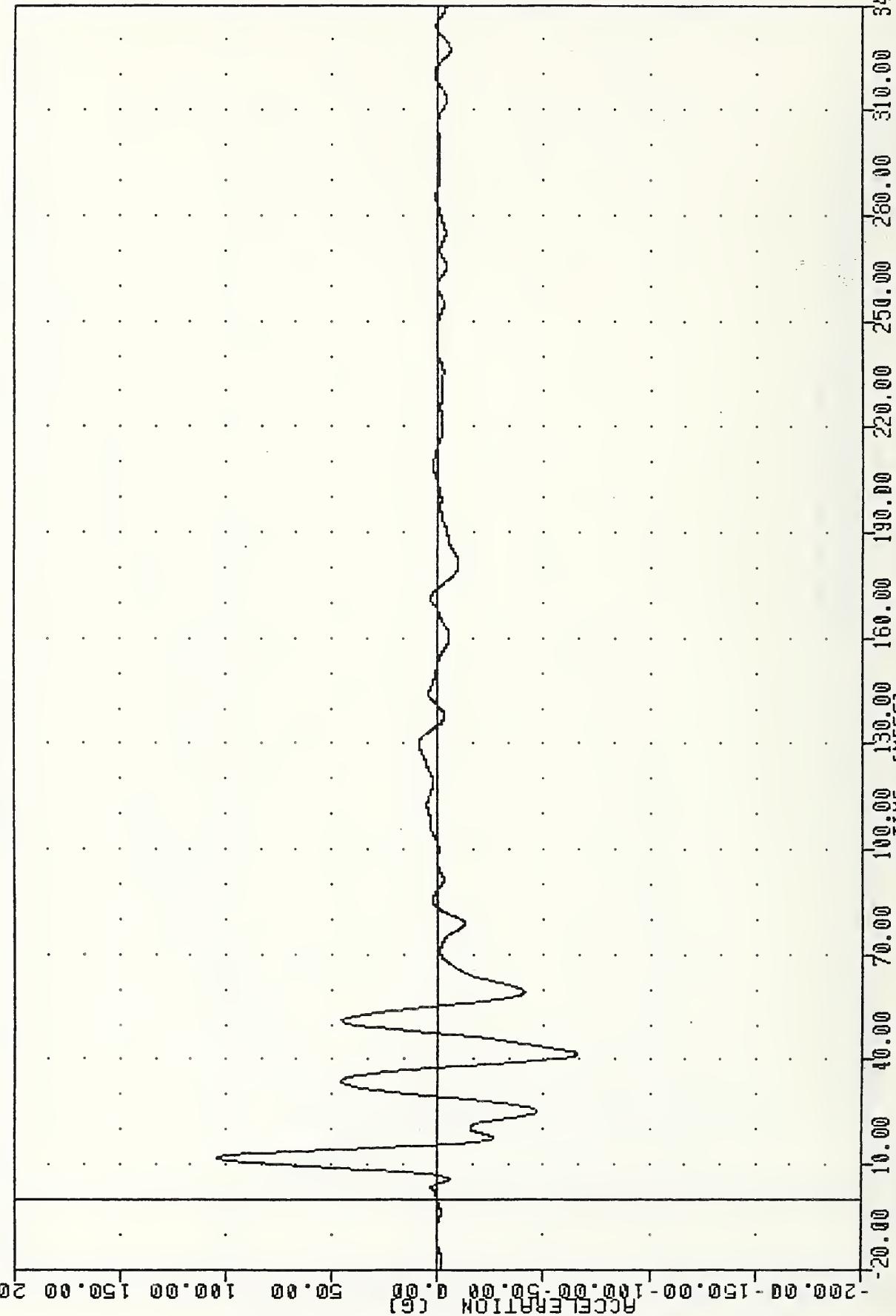
This delta velocity appears unrealistic following the initial velocity change.



VRI
SI PROTECTION PROD VEHICLE
853360000000
LFDY64

PLOT DATE 10-DEC-85 09:41:04

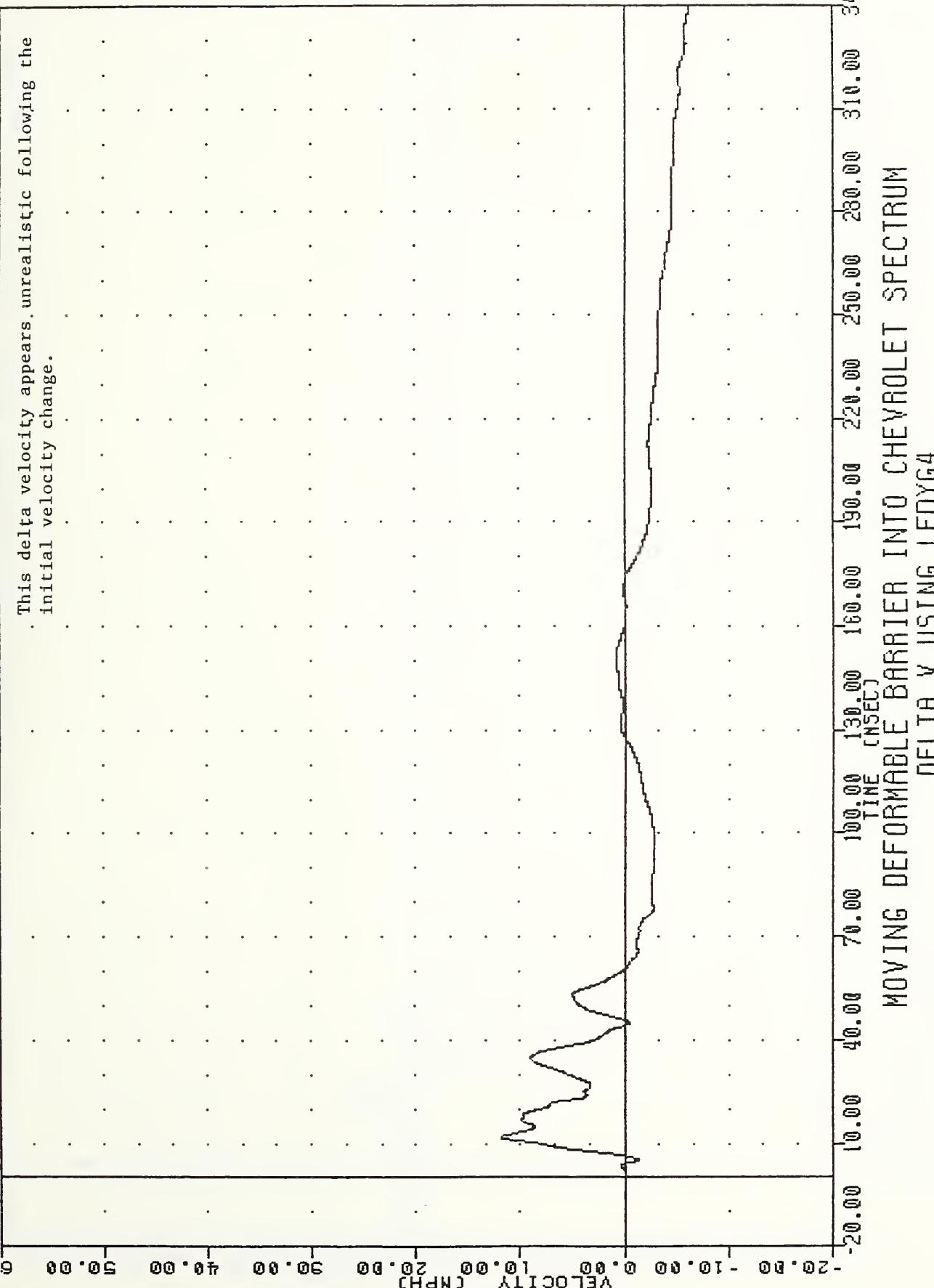
FILTER = BLPF 100 / 316 / -40
MIN. MAX VALUES = -65.718 41.50 , 104.31 & 111.88



VAT , 851202
SI PROTECTION PROD VEHICLE
85336000000
LFDY4

PLT DATE 10-DEC-85 09:41:04
FILTER = BLPF 3000 / 949/-40
MIN, MAX VALUES = -6.28@ 340.00 . 11.87 @ 11.75

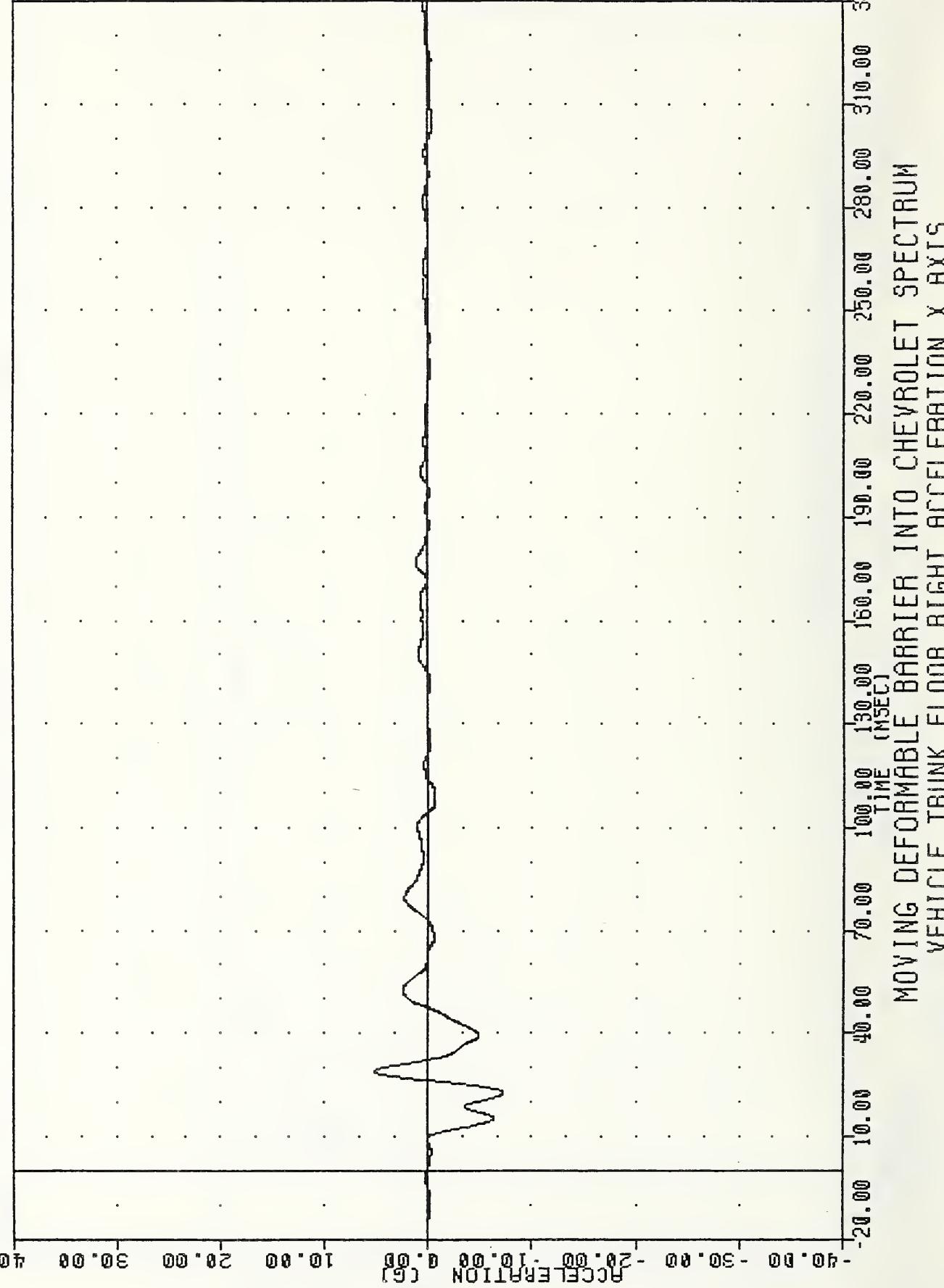
This delta velocity appears unrealistic following the initial velocity change.



VRT
SI PROTECTION PROD VEHICLE
85336000000
TFRXG

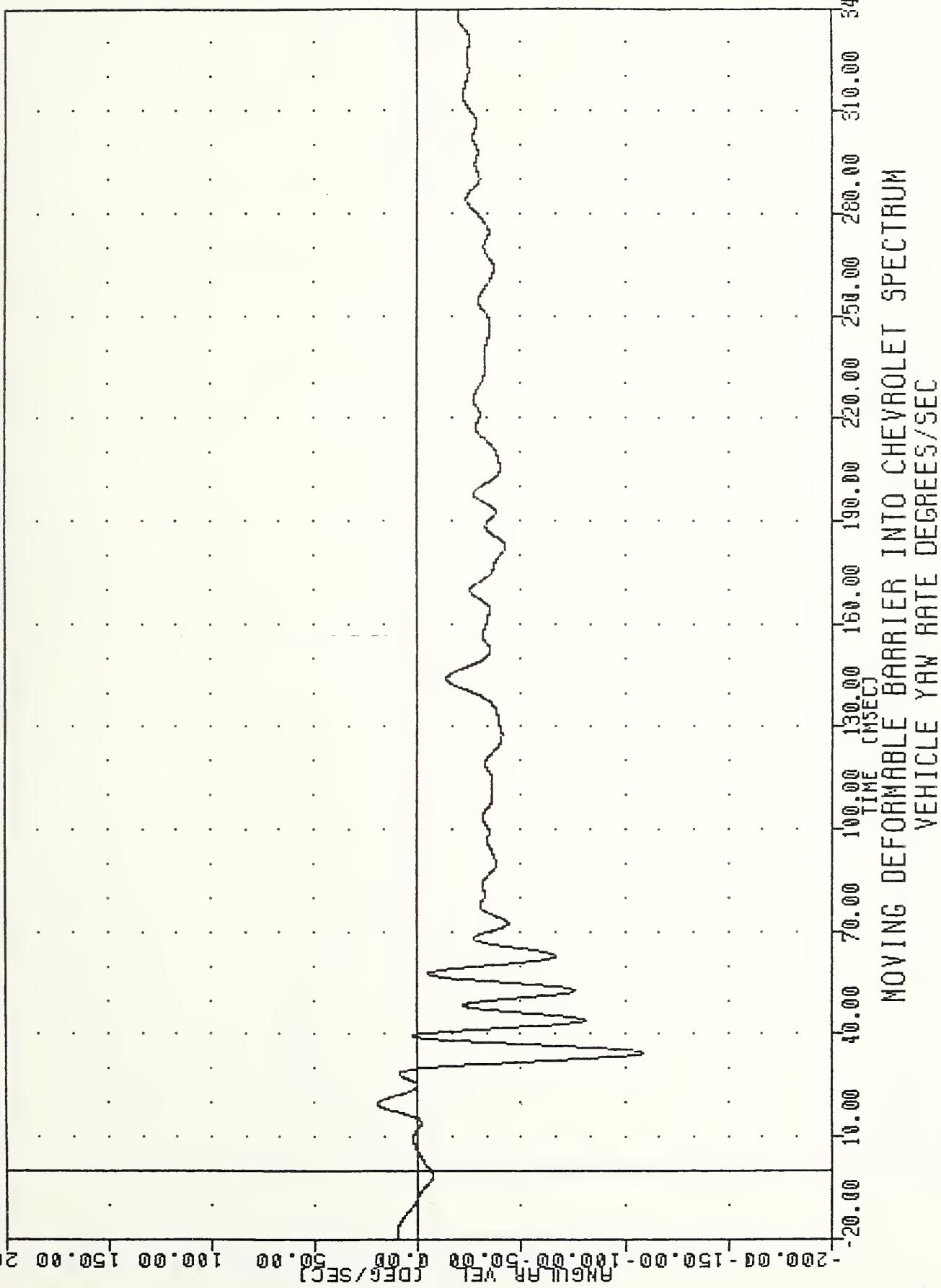
PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 100/ 316/-40
MIN, MAX VALUES = -7.178 22.63 , 5.21 & 28.88



VRI
SI PROTECTION PROV VEHICLE
853360000000
WCGZY

PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPF 100/ 316/-40
MIN, MAX VALUES = -109.04@ 34.50 , 19.58 @ 19.63

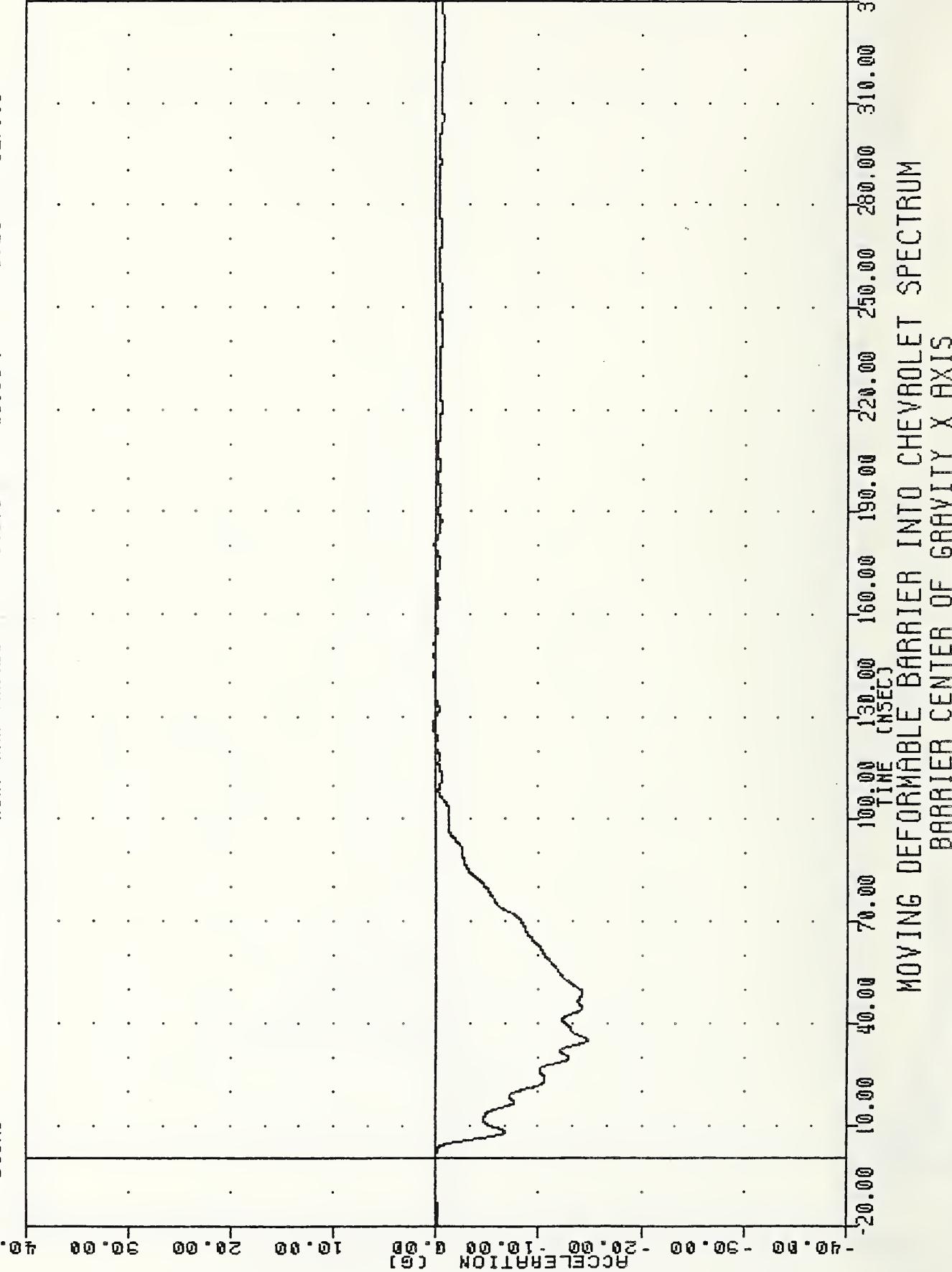


VHT , 851202
SI PROTECTION PROD VEHICLE
853360000000
BCGX6

PLOT DATE 10-DEC-85 09:41:04

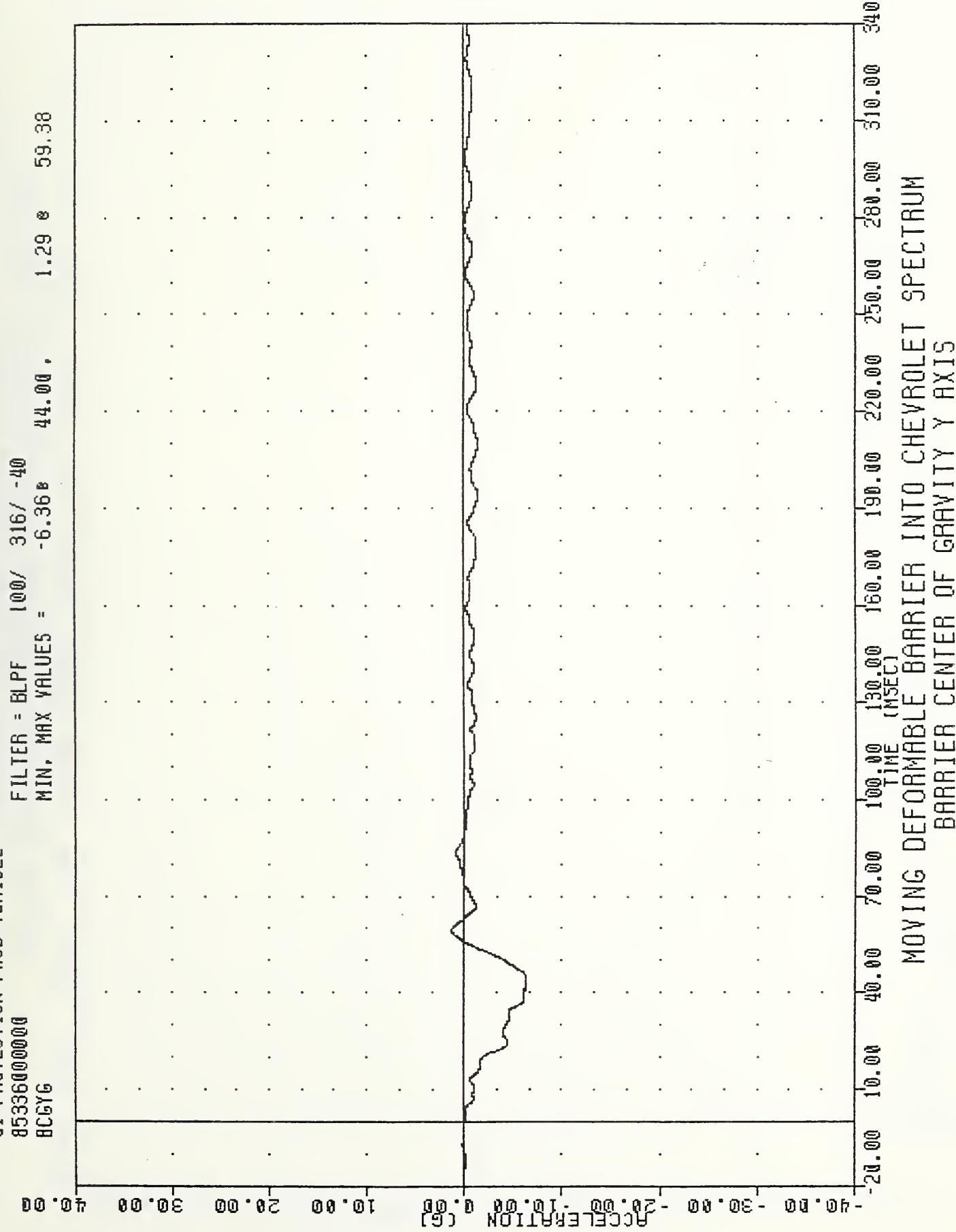
FILTER = BLPF 100/ 316/ -40
MIN, MAX VALUES = -14.708 35.00 ,

0.24 & 127.38



VRT 851202
SI PROTECTION PROD VEHICLE
853360000000
BCGY6

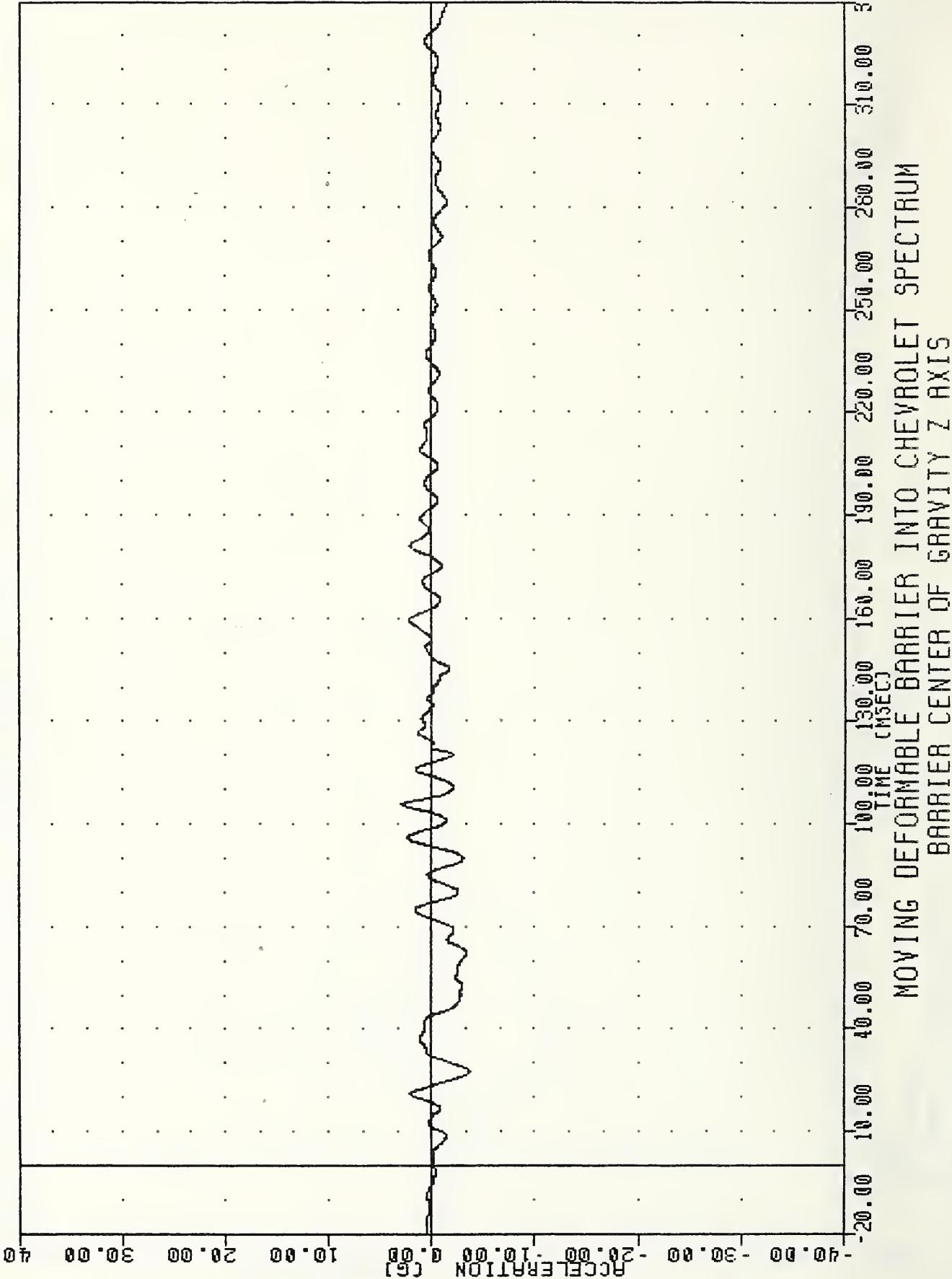
PLOT DATE 10-DEC-85 09:41:04



YRI
SI PROTECTION PROB VEHICLE
85336000000
BCGZG

PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 100/ 316/-40
MIN. MAX VALUES = -3.67 & 27.63 . 2.93 & 105.63



VRT
SI PROTECTION PROD VEHICLE
85336000000
ACGR6

PLOT DATE 10-DEC-85 09:43:55

FILTER = BLFF 100/ 316/ -40
MIN, MAX VALUES = 0.08B -5.38 , 15.52 @ 44.50

-10.00 0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

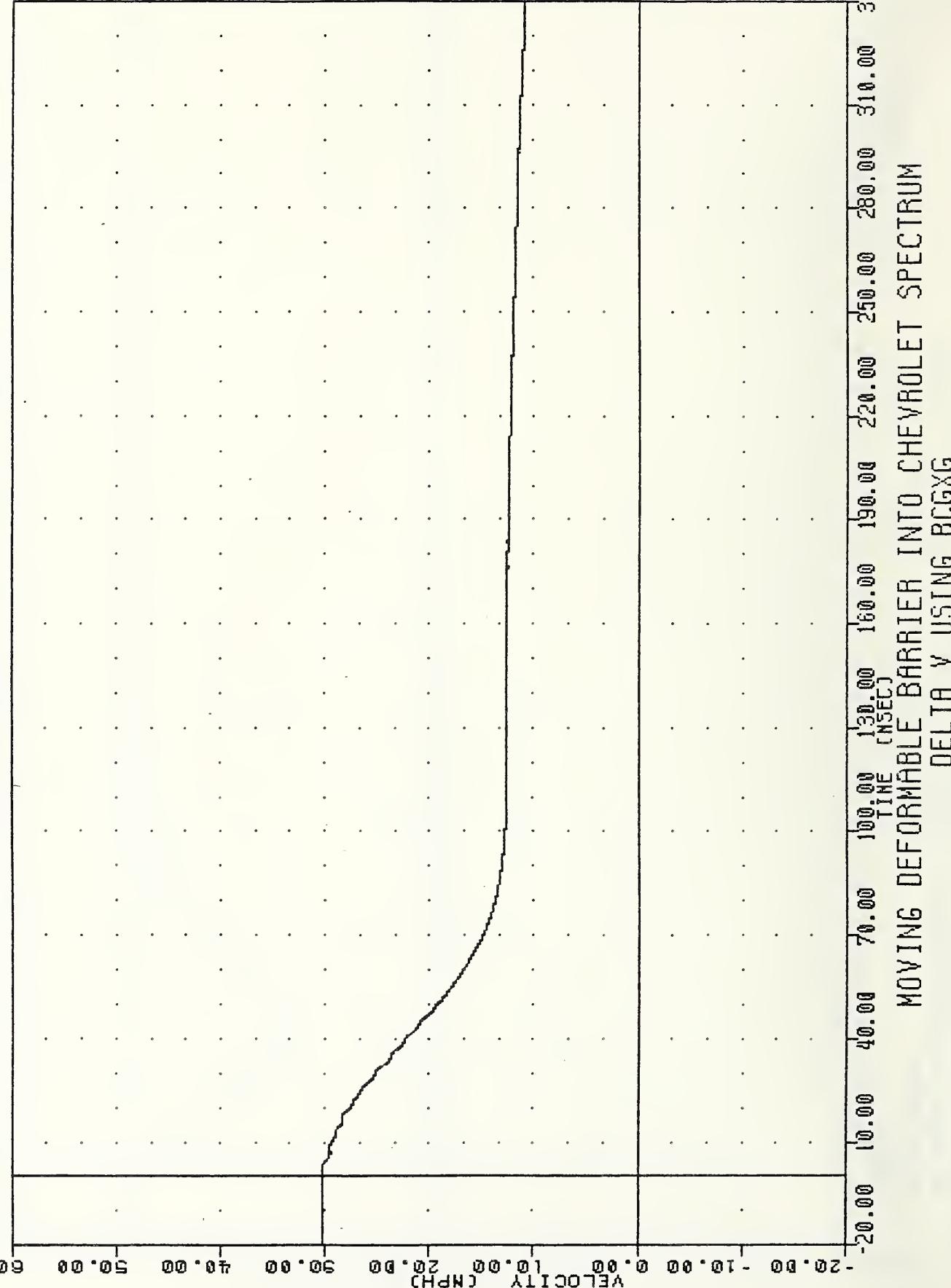
ACCELERATION (G)

MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
BARRIER CG RESULTANT

VAT
SI PROTECTION PROD VEHICLE
853360000000
BCGXY

PLOT DATE 10-DEC-85 09:41:04

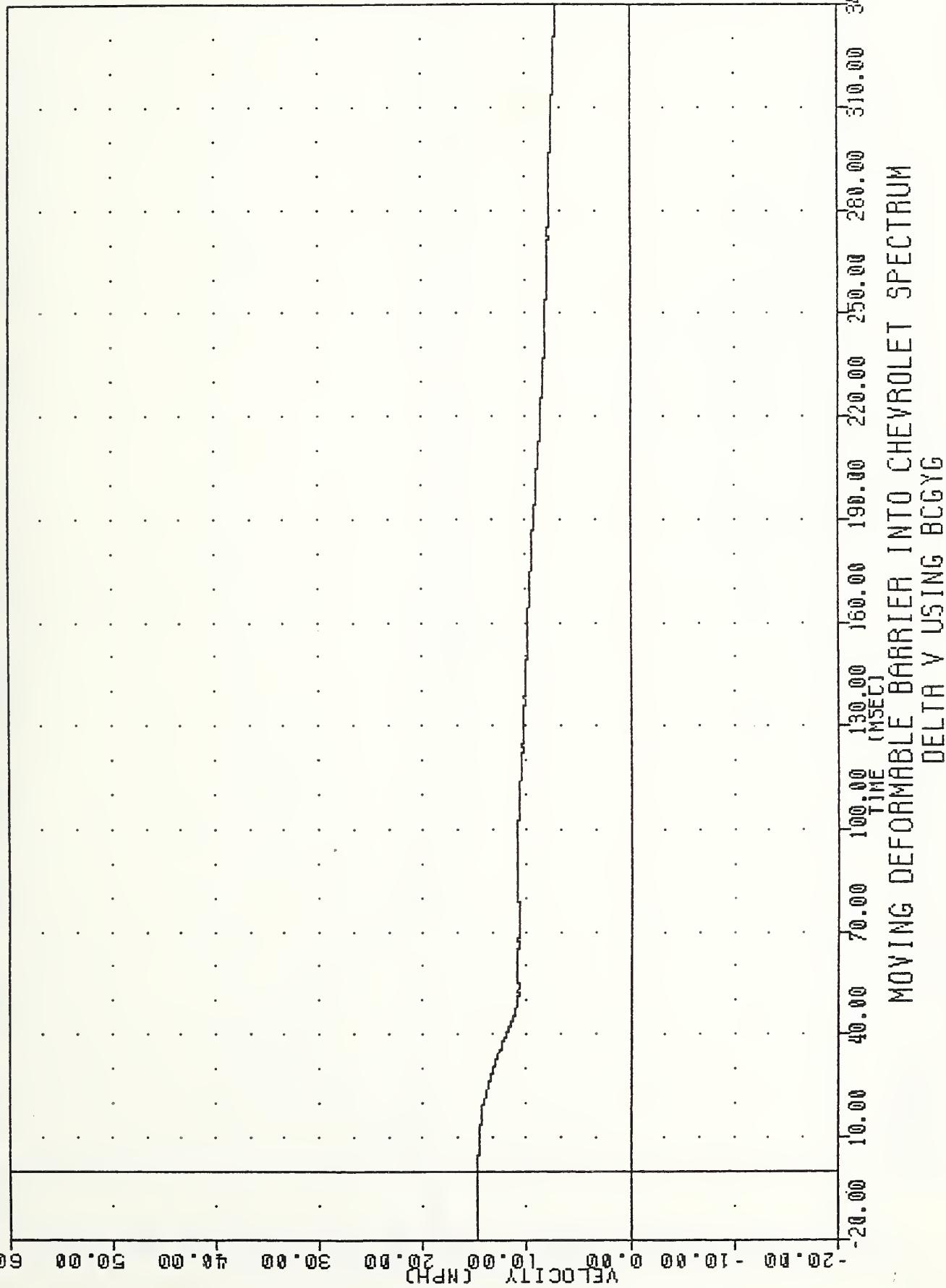
FILTER = BLPF 3000 / 949/-40
MIN, MAX VALUES = 10.83@ 340.00 , 30.20 @ -20.00



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING BCGXG

VAT , 851202
SI PROTECTION PROD VEHICLE
8533600000
BGGV

PLOT DATE 10-DEC-85 09:41:04
FILTER = BLPF 300/ 949/-40
MIN, MAX VALUES = 7.14@ 34



YRT
SI PROTECTION PROD VEHICLE
85336000000
BRCX6

PLOT DATE 10-DEC-85 09:41:04

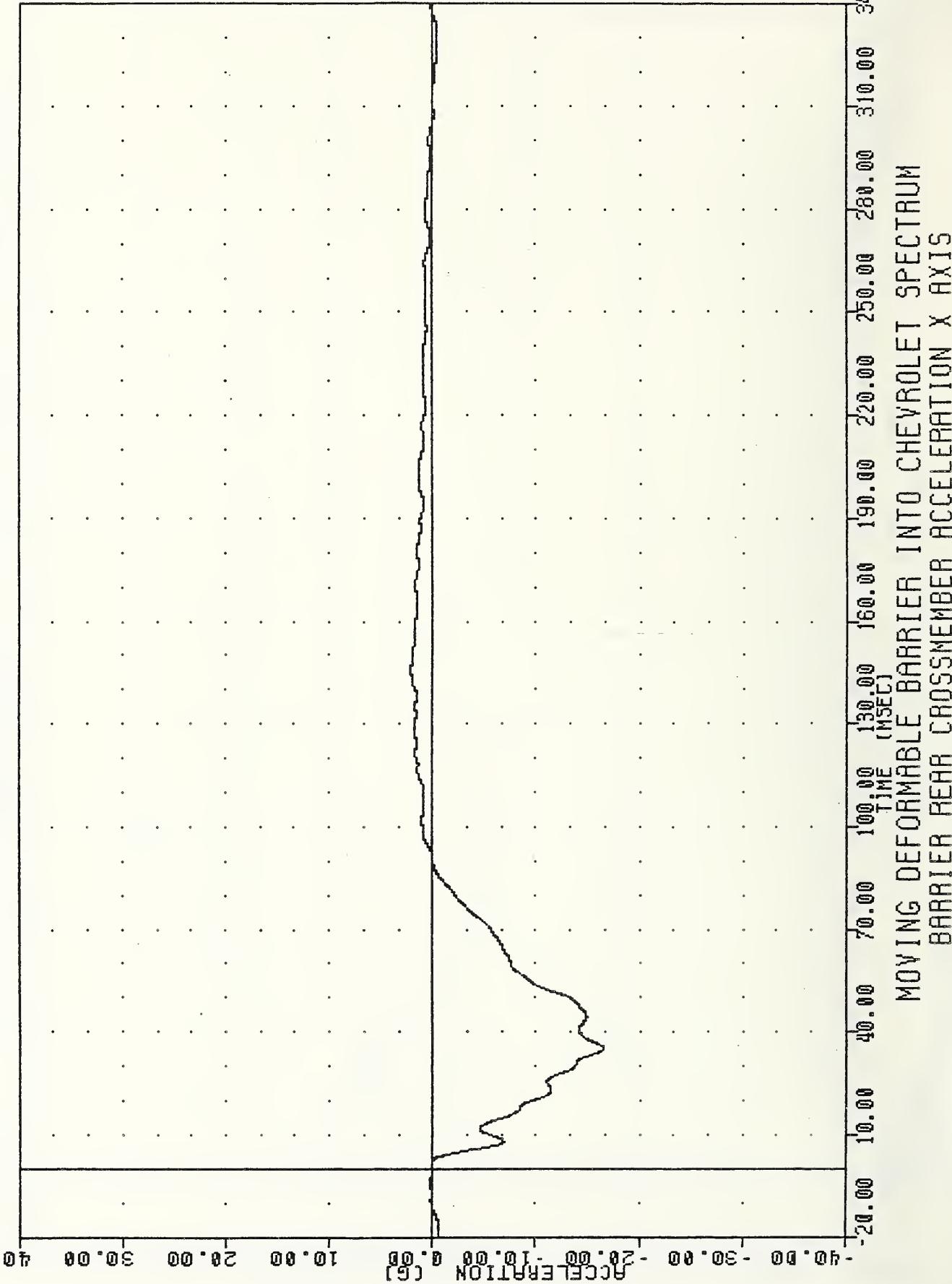
FILTER = BLPF 100/ 316/-40
MIN. MAX VALUES = -16.558 35.25 , 2.11 & 145.75

0.00

10.00
20.00
30.00
40.00

0.00

10.00
20.00
30.00
40.00



VRT
SI PROTECTION PROD VEHICLE
85336@00000
ERCY6

PLT DATE 10-DEC-85 09:41:04

FILTER = BLPPF 100/-40
MIN, MAX VALUES = -1.79@ 202.38 , 2.16 @ 16.68

0.00

10.00

20.00

30.00

40.00

0.00

10.00

20.00

30.00

40.00

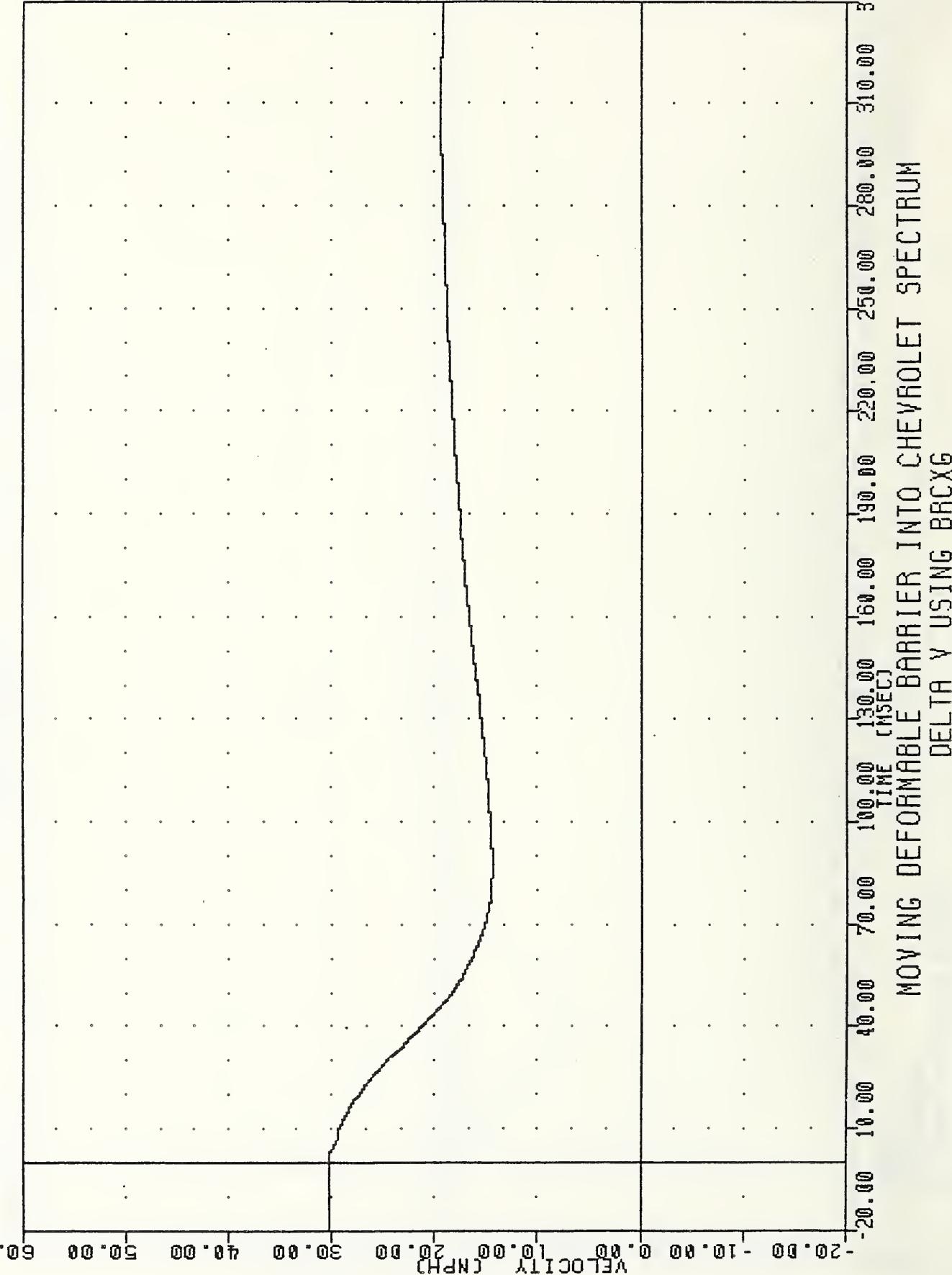
B-109

-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00
TIME [MSEC]
MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
BARRIER REAR CROSSMEMBER ACCELERATION Y AXIS

VRI
SI PROTECTION PROD VEHICLE
85336000000
BRCXV

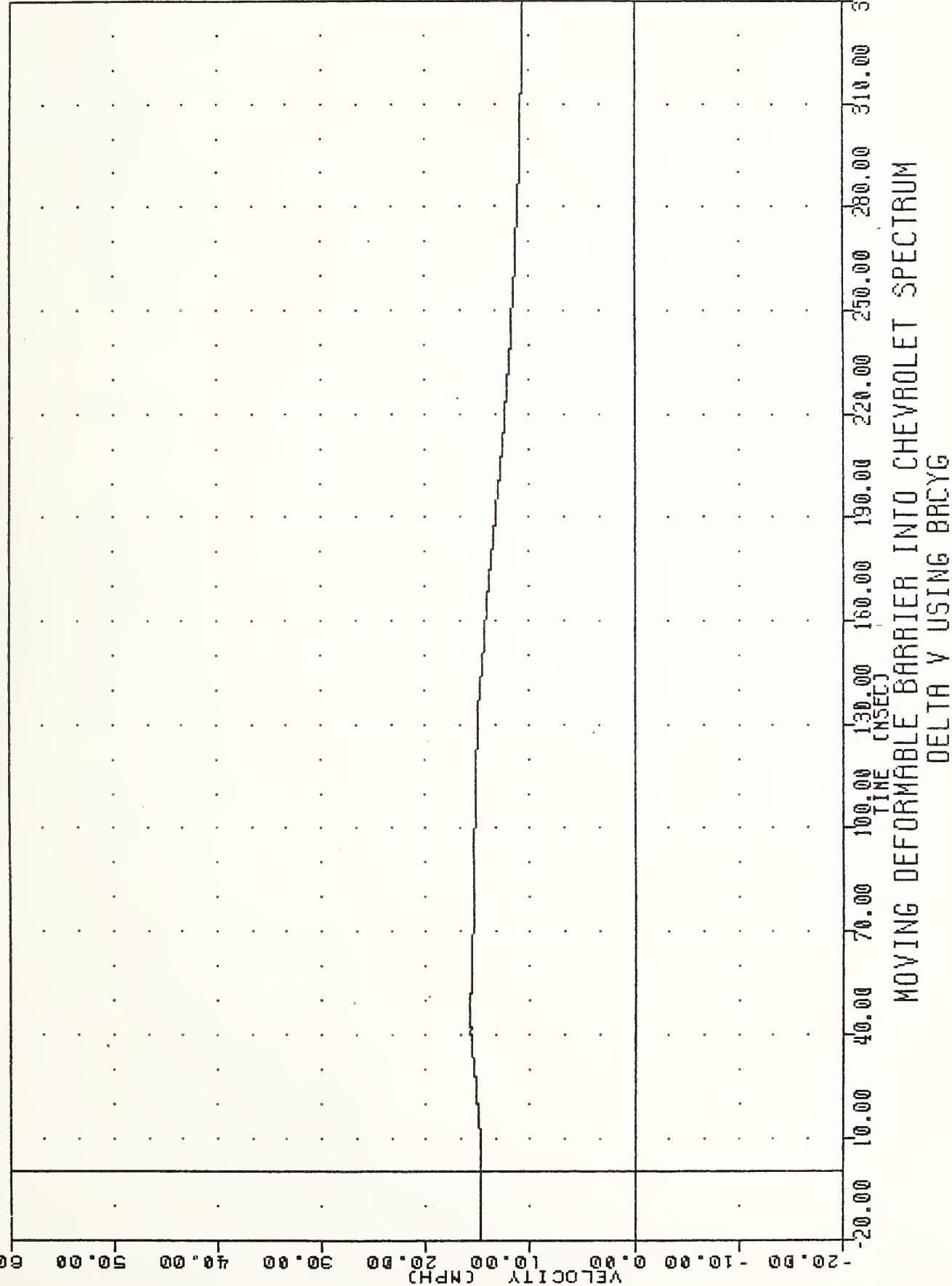
PLOT DATE 10-DEC-85 09:41:04

FILTER = BLPF 300/ 949/-40
MIN, MAX VALUES = 14.418 90.13 - 30.20 8 -20.00



VAT
SI PROTECTION PROD VEHICLE
85336000000
BRCYY

PLT DATE 10-DEC-85 09:41:04
FILTER = BLPF 300/
MIN, MAX VALUES = 10.71@ 340.00
15.76 @ 46.38



MOVING DEFORMABLE BARRIER INTO CHEVROLET SPECTRUM
DELTA V USING BRCYG



APPENDIX C
DUMMY CERTIFICATION

SIDE IMPACT DUMMY CALIBRATION
DUMMY SERIAL NUMBER 119

TEST/ DATE	CHANNEL	FILTER CLASS	PEAK ACCELERATION (g) SPECIFICATION	TEST RESULT
HEAD 11/26/85	HEAD Y-AXIS	1000	150-175	168.42
THORAX 11/26/85	LEFT UPPER RIB Y-AXIS PRIMARY REDUNDANT	180 180	36-50 36-50	39.19 40.79
	UPPER SPINE Y-AXIS PRIMARY REDUNDANT	180 180	16-24.6 16-24.6	21.77 21.56
	LOWER SPINE Y-AXIS PRIMARY REDUNDANT	180 180	17.6-26.4 17.6-26.4	21.41 21.26
PELVIS 11/27/85	PELVIS Y-AXIS	180	50-65	51.18

Note: Damper test performed 11-26-85
 Velocity = 17.09
 Displacement = 1.493 in.
 Force = 675.07 lbs.

SIDE IMPACT DUMMY CALIBRATION
DUMMY SERIAL NUMBER 016

TEST/ DATE	CHANNEL	FILTER CLASS	PEAK ACCELERATION (g) SPECIFICATION	TEST RESULT
HEAD 11/27/85	HEAD Y-AXIS	1000	150-175	157.67
THORAX 11/27/85	LEFT UPPER RIB Y-AXIS			
	PRIMARY	180	36-50	39.55
	REDUNDANT	180	36-50	40.96
	UPPER SPINE Y-AXIS			
	PRIMARY	180	16-24.6	20.10
	REDUNDANT	180	16-24.6	20.13
	LOWER SPINE Y-AXIS			
	PRIMARY	180	17.6-26.4	22.00
	REDUNDANT	180	17.6-26.4	22.02
PELVIS 11/27/85	PELVIS Y-AXIS	180	50-65	44.20

Note: Damper test performed 11-25-85
 Velocity = 16.97
 Displacement = 1.515
 Force = 666.25

U. S. DEPARTMENT
OF TRANSPORTATION

SAFETY VOLUNTEER
WELLNESS TEAM

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